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ABSTRACT

One of twelve instructional units in the Native American Career Education (NACE) program, this unit is intended to help Indian junior high school students understand the steps involved in making a product. Focus is on the subject areas of economics, lumber and furniture industries, and woodworking. The first two activities concern the nature of symbol systems, and how to read and construct a chart which breaks a task into steps and shows the relationship between steps. The third activity features a story about the construction of a cradleboard by a Navajo man as the basis for identifying steps in production by a single person. In the fourth and fifth activities, the production of an item in a technological setting is followed and the steps of production and occupations involved are analyzed. Each activity includes objectives, student materials, and suggestions to the teacher on how to use them. The activities include several exercises which consist of readings, questions to answer, games, simulations, project instructions, and other learning activities. Each activity is followed by suggestions for ways of extending learning and, where appropriate, additional resources are described. Student materials may be used as master co*ies for reproduction or as models for material development. A test designed to measure student mastery of the main objectives is included with each unit, along with an answer key. (A guide for the whole twelve-unit program is also available--CE 014 035.) (TA)

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FROM IDEA TO PRODUCT

Native American Career Education
Unit

We would like to thank Ron White of the Apache-Navajo Career Education Resources (ANCER) Center, St. Johns, Arizona, for permission to include the Navajo Forest Products Industries slide-tapes on Woods Operations and Sawmill in this unit.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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This document is one of a series of teaching/learning units dealing with Native American Career Education. The titles of all individually available documents in this series appear below:

Career Awareness units
Part of the Whole World
Cooperation
From Idea to Product
The Community
The Community in Transition

Career Orientation units
Putting Your Money to Work
Living with the Land
Working for the People

Career Exploration units
Planning
Putting It All Together
Getting Ready for Jobs
The Career Fair

and

Native American Career Education,
A Curriculum Guide

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Foreword

The Native American Career Education Program consists of twelve units designed to address the specific needs and aspirations of Native American students. It includes teacher and student materials, evaluation materials, and a Curriculum Guide.

These units employ a variety of learning activities. They are designed to: 1)bridge the gap between traditional and technological societies by identifying the parallels between them and exploring the values they represent; 2) create an understanding of the economic context within which career choice takes place; 3) foster personal and interpersonal skills necessary to function in the world of work; and, 4) develop career exploration skills.

Development has been based on the recognition that the needs of Native American communitites differ greatly from those of the larger American society. In these communities, as in third world countries, problems are not due to a lack of natural resources, but rather to a lack of meaningful development of human resources which would allow for additional economic development and self-determination of Native American communities.

In order to identify and meet these needs, information has been gathered from Native American communities, students, teachers, and tribal groups, and the materials have been developed with the guidance of an advisory committee of Native Americans.

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Preface

It is both necessary and important to provide Career Education for Native American students at early grade levels. Hopefully it will enable students to begin the process of thinking about and making early decisions concerning career selection.

"From Idea to Product" will be particularly interesting to Native American students who may be interested in careers associated with the production of timber. Forest Industries are a major industry on many reservations, and many Native American students can readily identify with the careers pictured in this unit.

The exercises developed for the unit are well designed, and provide for continuous review and feedback of information for the student. Several types of activity are included, so that their diversity will help maintain student interest.

Joy Hanley, Navajo
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Contents

This book includes all information and student materials needed for the unit, "From Idea to Product." In some activities, students will be asked questions which they must answer in writing. Many of these questions have no single "right" answer. For your convenience, some sample answers have been printed after each set of reproduced questions.

At the end of this guide, you will find an annotated resource list. This has been included to help you locate good, appropriate audio-visual materials in order to stimulate student interest in the unit and to enrich their individual learning experiences.

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An Overview of the Unit

General Purpose

From Idea to Product is one of the twelve units in the Native American Career Education program. The general purpose of this unit is to help Native American students understand the steps involved in making a product, whether the process is simple and done by one person or complex and done by many people in interrelated jobs. This understanding forms the basis for the study of the relationships between economics and occupations and of the roles played by various occupations in fulfilling the community's needs in this unit and others in the program.

Goals and Objectives

In this unit, there are six activities. Each activity has a specific goal and a specific objective. These are as follows:

Activity 1. *Symbols for Words*

GOAL:	To introduce the idea that symbols can be used instead of words to convey meaning effectively.
OBJECTIVE:	Students will study some uses of symbols by Native American cultures and will be introduced to some symbols used in charting.

Activity 2. *Making Charts*

GOAL: To introduce students to a method of analysis (i.e., charting) which will permit them to break up a job or activity into steps and show the relationship between the steps

OBJECTIVE: Students will study charts of simple activities and will make their own charts for familiar tasks, using the symbols taught in the last Activity.

Activity 3. *Meeting a Need--Step by Step*

GOAL: To help students recognize the basic steps in making a product

OBJECTIVE: Students will study the making of a product by one person and will identify the basic steps involved.

Activity 4. *Splitting Up the Work, Part I*

GOAL: To help students understand the first steps in making a product (harvesting and processing raw materials) in a technological setting

OBJECTIVE: Students will study and identify some steps and jobs involved in harvesting and processing raw materials in the lumber industry.

Activity 5. *Splitting Up the Work, Part II*

GOAL: To help students understand the steps in finishing a product in a technological setting

OBJECTIVE: Students will study and identify some steps and jobs involved in making a mass-produced playpen.

Summary

In this unit, students will do readings and written exercises, including charts (specifically a simplified form of flow charts), designed to give them a basic understanding of the stages involved in producing a product the relationship between economics and occupations, and the roles played by various occupations in fulfilling the community's needs.

In addition to learning the technique and symbols of charting, students will learn to list the basic stages in producing an item from concept to consumer and to identify these stages in the production of an item by one person; to identify basic stages in production of an item by a group or several groups of people, identify professions and jobs involved at each stage, and compare a one-person versus a multiple-person operation; and to identify the basic production stages for different kinds of products and understand the role played by production chains in a community's economy.

In the first two activities, students will learn the nature of symbol systems and will learn how to read and construct a chart for familiar tasks. This type of chart permits students to break a task into steps and show the relationship between the steps. The activities feature a combination of reading and written exercises.

The third activity will feature a story about the construction of a cradleboard by a Navajo man. Students will read this story and use it as the basis for identifying steps in the production of something by a single person. They will use their new charting skills to analyze the direction and relationship of these steps.

In the fourth and fifth activities, students will learn about the production of an item (a baby's playpen) in a technological setting, from location of raw materials (trees) to completion of the finished object. They will identify steps in production and occupations involved at each step. If possible, you should use audio-visual materials, field trips, etc. in these activities, in addition to the readings and exercises

This unit would be most appropriate for use as part of a social studies course, especially one that deals with economics. It could also be done in connection with woodshop. It might even have some application to science (charting, study of process, use of machinery).

All units in the Native American Career Education program should be tailored to meet the interests and needs of the individual students in your class. There are many decisions, therefore, that you will have to make yourself. For instance, in regard to any particular exercise, you will want to ask yourself, Should the students work in small workgroups (six or seven students each), or will they benefit more from the activity by working alone? Should the exercise be given to the class as a homework assignment, or should it be done in the classroom? How much supervision will the students require? Will they be able to do a given reading on their own, or should the material be read to them? In making your decisions, be flexible. Shape the unit so that it best suits you, your students, and the amount of time available.

Scheduling

Activity 1 - one class hour

Activity 2 - one class hour

Activity 3 - one to two class hours

Activity 4 - two to four class hours

Activity 5 - two to three class hours

Materials

For this unit, you will need:

- extra notebook paper and pencils
- access to blackboard, seating for workgroups etc.
- access to encyclopedias and other research material
- examples of symbols and symbol systems (optional)
- examples of charts (optional)
- 1 sheet of cardboard or heavy paper per student
- glue
- scissors
- cradleboard or pictures of same (optional)
- Navajo Worker Series slide tapes on the Mill and Woods Operations (optional--see Additional Resources list for details)
- Telephone book(s)

Introducing the Unit in Class

Reading the Poem

If students have not had other units in this program, read them the poem by David Martin Nez (p. 7). Or you may wish to reproduce copies and hand them out insteal. Afterwards, encourage the students to discuss what they think the poem is saying. Then suggest that it is saying: 1) that it is important to learn what other cultures have to offer; and, 2) that it is important to understand and preserve the beauty of one's own culture.

Introducing the Program (If students have not had previous units.)

When the class has discussed the Nez poem, write the words *Native American Career Education* on the blackboard. Ask the students to discuss what they think this phrase means. If they have trouble getting started, help them by breaking the concept into parts. Ask questions that will lead the class step by step to a general understanding of the ideas involved.* Students should be encouraged to work together in small groups to answer questions like these:

1. What is an American?
2. What is a Native American?
3. What is a career? Can you name some examples of different types of careers? Are there any careers which interest you right now? How do people get started in careers?
4. What do you think that career education is?
5. What do you think that career education for Native Americans is? How might this be the same as career education for other kinds of Americans? How might it be different?
6. Why do you think we are going to study Native American Career Education now? How do you think that this type of education can play an important part in your life? What kinds of things do you think you need to learn about careers?

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*Depending upon your class, you may wish to rely less on discussion activities like this one. As an alternative, ask the students to answer the given questions in writing. Or, present the information here in lecture form.

Read aloud, or reproduce and hand out, the selection on p. 8 of this book called, "What Native American Career Education Is All About." Afterwards, ask the students to discuss and expand on what they have read. Focus student attention on certain key ideas by repeating some of the earlier discussion questions. Ask, "How can Native American Career Education play an important part in your life? What kinds of things do you think you need to learn about careers?

Introducing the Unit

Divide the class into groups and ask them to discuss now what they think this book is about. During the discussion, ask the students to review the suggestions which you wrote earlier on the blackboard. Encourage them to add to this list any new ideas that they have to offer.

Explain that *From Idea to Product* is about how people make things. As they read this book and do the worksheet activities, students will be asked to think about the process of making a product, whether it is done by one person or by many. Many careers involve making or helping to make a product. The making of most products requires the work of many different people doing different jobs. By learning about the jobs and steps involved in making a product and about the way that products meet human needs, students may discover a job or type of job which will interest them.

On page 9 of this book there is a section called, "What This Book Is All About."

Read this, or reproduce it and hand it out for students to read themselves. As you review this afterwards, concentrate on the fact that the main activity in this unit will be learning the steps in making products and how the jobs connected with making a product are related to each other.

As you review the content of "What This Book Is All About," you should also include the following three ideas:

1. Students will be doing a series of exercises which contain questions. By finding the answers to these questions, the students will learn about some of the different ways that products are made in our society.

2. The students will be asked to work together in small groups for many of the activities in this unit. There are two reasons for this. First, small group work has been found to be a good way of doing the types of activities which this unit involves and, second, small group work will expose the students to the kinds of group situations which they will experience on most jobs.

Review

Before beginning Activity 1, review what you have done so far in class. If you have introduced the unit successfully, the students should be able to supply a general answer for each of the following questions:

1. What does Native American Career Education mean?
2. What is the book *From Idea to Product* going to be about?
3. What will you be expected to do in this unit?

These lines are taken from the poem "New Way, Old Way," published by The Writers' Reader, 1964, copyright 1969. Used by permission of the author, a former student at the Institute of American Indian Arts, Santa Fe, New Mexico, a Bureau of Indian Affairs school.

We shall learn all these devices
The white man has.
We shall handle his tools
For ourselves.
We shall master his machinery,
his inventions,
his skills,
his medicine,
his planning;
But we'll retain our beauty
And still be Indian.

David Martin Nez

What Native American Career Education Is All About

All over the country, Indian students, parents, and communities are asking, "Where can we find good jobs?" For too long, too many Indians have ended up with poor jobs or no jobs at all. Career education is one way to change this.

Planning for a career should begin long before you actually start working. But what kinds of jobs are there? What are different jobs like? How do different jobs fit together? How do you find out which job would be best for you? Career education is one way to find the answers to questions like these.

Native American Career Education is a program that has been written especially for Indian students. Indians from many tribes have helped plan, write, and test this program to make it as useful as possible to you. Some of the activities may seem like games. That's because we think learning can be fun. Sometimes even work is fun!

Good luck!

What This Book Is All About

Why are there so many different kinds of jobs?

How are different kinds of jobs related to each other?

Is there any way of looking at different parts of a job so that they make sense?

Maybe you have wondered about things like this. In a single family group, or in a small village, everyone knows what everyone else does and why. Most often a job is done by one person who does all the parts of the job alone. Or a job may be done by a few people working together. But when you look for work in the city or in a big industry, you will find many different businesses. Each business has hundreds of different jobs. This can be very confusing.

In this unit you will learn something about how the parts of a job, and related jobs in making a product, fit together. First you will learn how to make a simple chart that you can use to describe the steps in a job. Then you will look at the steps in making something when the job is done by one person. Finally you will see how these same steps are done by many people to make a product in industry. You will look at some of the many jobs involved in making certain kinds of products.

Activity 1. Symbols For Words

GOAL:	To introduce the idea that symbols can be used instead of words to convey meaning effectively
OBJECTIVE:	The student will name uses of symbols by Native American cultures and identify 4 basic chart symbols

WHAT STUDENTS WILL BE ASKED TO DO

- Read a passage about use of symbol systems by Native Americans
- Answer review questions about the passage
- Look at some simple symbols used in charting and learn their meanings
- Make patterns of the symbols
- Identify the symbols when they are presented in a review exercise

MATERIALS NEEDED

- For Exercise 1: examples of symbols--trademarks from magazine advertisements, International Driving signals, etc. (optional)
- For Exercise 2: and
- For Exercise 5: pencils and paper
- For Exercise 3: examples of charts, especially those showing steps in a process or showing interrelated parts of a complex machine (optional)
- For Exercise 4: cardboard or heavy paper, 1 sheet per student
  glue
  scissors
  duplicated copies of page 23 of this Teachers Guide, 1 per student

Procedure *

Draw on the board a stop sign, a yield sign, or other simple symbols (used with or without words) with which you think students might be familiar. Depending on the interests of your students and the availability of materials, you might also wish to display and discuss symbols used in international driving signs (e.g. pedestrian crossing, no turn, animal crossing) or in familiar trademarks (e.g. the curly writing on Coca-Cola, the scallop-shell symbol for Shell Oil). The trademark symbols could be cut from magazines or newspapers. (If students are interested, they can be asked to bring in other examples of their own.)

Bring out the idea that pictures, especially certain rather simple pictures done in the same way every time, can be used to stand for ideas. Once one has been introduced to the meaning of the stop sign or the Shell Oil sign, for instance, one can recognize the sign and remember the meaning without seeing any words.

For each familiar symbol you discuss, ask questions such as, "What does this mean? How do you know? Do you need to read in order to know what this means? Does it mean the same thing every time you see it?"

Students are being introduced to the idea of symbols in order to prepare them for learning certain simple symbols used in charting activities. They will be introduced to these symbols later in this activity.

Exercise 1. Reading (Talking with Pictures)

To familiarize them further with the idea of using pictures or symbols to stand for ideas, students will be asked in this exercise to consider some of the numerous symbol systems used by various Indian tribes.

Reproduce and hand out pp. 13-16 in this book. When students have had a chance to read the pages, ask questions about each type of symbol system presented. Questions might include: "What was this kind of picture or symbol used for? Who used it? Where did those people live? Do you know of any other symbols that are used in the same way?" Students may discuss either Indian or non-Indian examples. If any of your students belong to any of the tribes discussed, you might ask them if they have ever seen an example of the kind of symbols shown or if they know where (museum, etc.) such an example might be found. If feasible, you might even take students to see such examples.

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*Remember that the directions given in this Teacher's Guide are only suggestions. Use them to create a course which best suits you, your individual students, and the amount of time which is available.

Symbol system discussed in the reading are:

Iroquois wampum belts: (page 13) The Iroquois League and their various tribes preserved a number of belts made of wampum beads. These belts represented through symbols important events such as the founding of the League.

Totem poles: (page 14) Northwest Coast Indians carved poles with figures and designs to tell stories from personal or clan history, celebrate important events, record ancestry, etc.

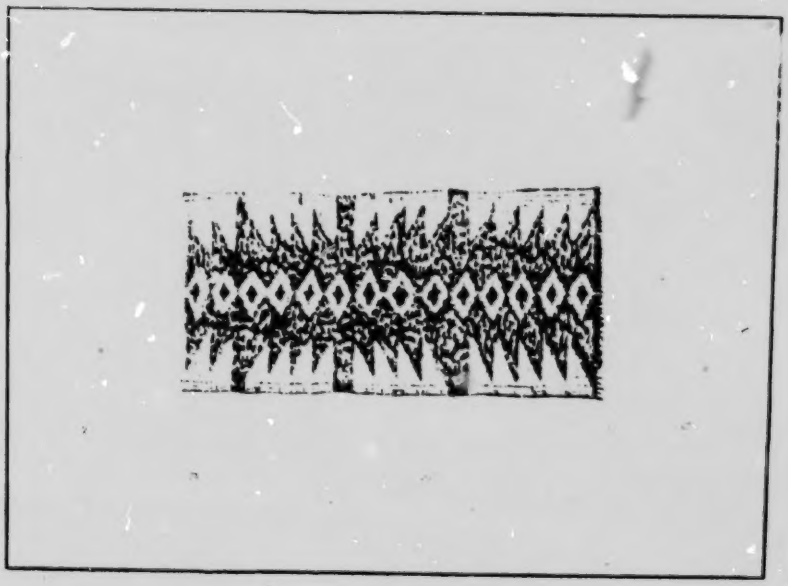
Plains sign language: (page 14) Plains tribes who did not speak each other's languages used this system. It was an extremely flexible and useful system of communication. You might wish to compare (a) the sign language used by deaf-and-dumb people; or (b) the international road signs, which are also used to communicate certain meanings to people who do not share a common language.

Plains Indian record drawings: (pages 14 and 15) Sioux and other related tribes kept record of important historic events by painting symbolic pictures of them on buffalo hides and adding a dot to represent each year that passed. The picture reproduced is a copy of a record drawing of the treaty with William Penn in 1678. The drawing was copied by a white scout in 1874.

Navajo sand painting: (page 16) These paintings present sysmbols in specific combinations and relationships which are meaningful in tribal religion. They are an important part of ceremonies such as healing ceremonies.

By the end of the discussion, students should realize that symbol systems can sometimes be a very effective and efficient way of describing something or conveying meaning.

TALKING WITH PICTURES



The Iroquois tribes used belts of wampum (bead made from shell) like this to tell about important events. Each tribe in the Iroquois League had special people to "read" the belts. They said what the belts meant as they touched the beads.

This wampum belt tells about the time when the Onondaga chief Tadodaho tried to keep his tribe from joining the Iroquois League. They could not start the great League until Tadodaho agreed to join.

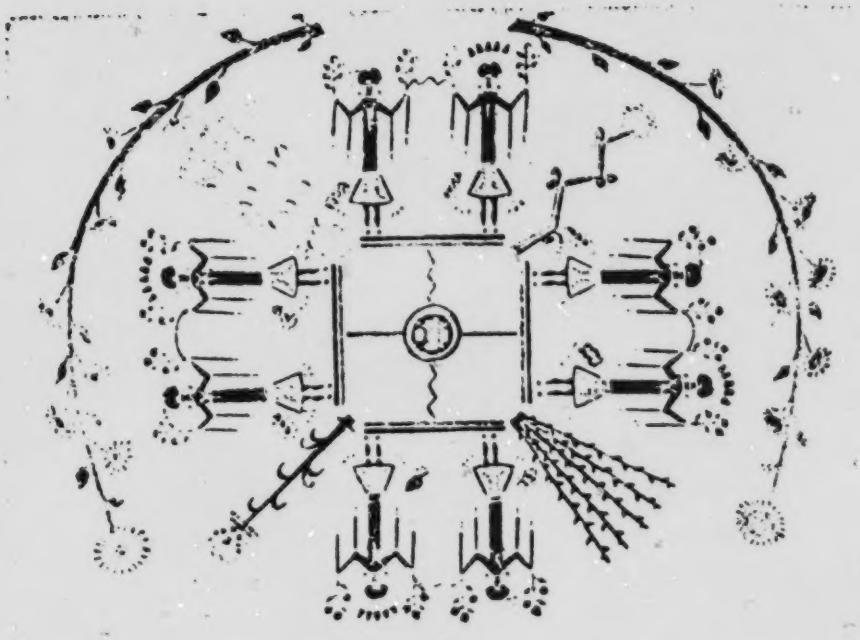
In the Pacific Northwest, totem poles like this one told about a man's family, the important things he had done, and his religious experiences.

In the plains, tribes with many different languages worked out a system of making symbols with their hands. This was called "sign language." It let the tribes "talk" to one another without words.

The picture on the next page is symbolic picture the Sioux made. This picture tells about the treaty in 1768 with William Penn (who brought the first white settlers to the state of Pennsylvania). The ancestors of the Sioux still lived in Pennsylvania then. The tree with no leaves shows that the treaty was made in winter. The 196 black dots show that it happened 196 years before the picture was drawn.

Copy of the Sioux record drawing of
the treaty made with William Penn on
the River Delaware, 1768

Navajo sand paintings also use symbols. In these paintings, the symbols are placed in certain patterns for religious purposes.



Exercise 2. What Do the Pictures Say?

Hand out copies of the review exercise on p. 18. Ask students to read the instructions silently, or you may paraphrase them with explanations if necessary. Answer any questions they may have, and remind them that these questions are based on the material they have just read, which they can refer to for information.

In this book, many of the student exercises will be followed by sample answer sections (Feedback). You can use these answers as a guide to assessing student responses yourself, or you may read, or reproduce and hand them out to students to check their own work. If you choose to do the latter, be careful to make clear to students that these are only examples of correct answers. In other words, though the ideas should be the same, the wording does not have to be. To get this point across, you might ask, "Which do you think is more important, ideas or words? Why", and give some examples of pairs of statements which express the same idea in different words. This understanding is essential, if students are to benefit from using Feedback sections in this and other exercises.

Before moving on to the next exercise, make sure that students understand that symbols or pictures can be used instead of words to communicate ideas.

EXERCISE 2. WHAT DO THE PICTURES SAY?

How well do you remember what you have read about the ways that some Indian tribes use pictures and symbols? On a separate piece of paper, copy and complete the following sentences.

1. Wampum belts were used by the Iroquois to _____.

2. The black dots stand for _____ in the symbolic record pictures of the Sioux.

3. Totem poles recorded personal, historic, and supernatural events for tribes in the _____ area.

4. The figures in Navajo sand paintings are _____ symbols.

Feedback

EXERCISE 2. WHAT DO THE PICTURES SAY?

1. Wampum belts were used by the Iroquis to *record historic events.*
2. The black dots stand for *years which have passed* in the symbolic record pictures of the Sioux.
3. Totem poles recorded personal, historic, and supernatural events for the tribes in the *Pacific Northwest* area.
4. The figures in Navajo sand painting are *religious* symbols.

Exercise 3. Symbols for Charts

Remind students that symbols are sometimes used *along with* words as well as *instead of* words. Refer back to examples of this type which you discussed earlier, e.g. stop sign, trademark which involves both shape and words, etc.

Explain that students are now going to learn some simple symbols which they can use along with words to make a useful kind of chart. If students do not know what a *chart* is, write this word on the board. Direct their attention to any charts or diagrams which may be in the classroom (or bring in some examples, if you wish). Charts which show a process or which show how something works would be especially useful here.

Bring out the idea that charts and diagrams can be used to show how something works or how the related parts of something fit together. Charts of the inside of an automobile show how the related parts of something fit together, for instance. The directions sheet for a dress pattern is also set up in a step-by-step, chartlike form. You and/or students may be able to think of other examples. If the charts you discuss use any special symbols, print them out.

Explain that the kind of chart that students will be making during this unit is used to show how the parts of a job fit together. It will allow them to see, quickly and easily, what the steps in a job or activity are and how the steps relate to each other. In later activities in this unit they will be asked to use this chart to analyze or "take apart" complicated jobs such as occur in the manufacturing of a product in industry. However, they will deal with very simple jobs at first.

The kind of chart which the students will be using is a much simplified version of the "flow chart" often used by large businesses and other groups. It allows representation of sequence and relationship without resorting to complicated sentence structure. It is, therefore, especially useful for students who may be having trouble with the structure of English.

Point out to students that this kind of chart will help them see the following things about a job:

1. *Which step comes after which*--that is, the order or sequence in which steps occur. What must happen first in order that something else may happen next?

2. *More than one thing going on at the same time*--that is, simultaneity. Sometimes two steps, or sets of steps, in a process are happening at once. The chart can show this.

3. *"Forks in the road"*--that is, possible choices and the consequences of each. In this kind of chart, choices are usually represented as decision points with "yes" or "no" alternatives. Subsequent steps in the process will differ according to the answer chosen.

4. *Repeating actions*--that is, cycles in which one or more steps in the process are done over again, usually as a consequence of a choice made at a decision point.

Explain that the words in this chart will tell the steps in the job being "taken apart" (analyzed). The symbols in the chart show the relationship between the steps ("how they fit together")--which ones come after which, which ones involve decisions, and so on.

Point out that, in addition to the use students will make of the charts later in this unit, they may find the charts useful in their own lives. If they are having trouble understanding something (for instance, a problem in mathematics or science, or a sequence of historical events) they may find that it helps to make a chart of the problem, showing the steps and their relationship. Charting breaks complex problems down into small pieces, which can then be dealt with one at a time. Charts are good for planning things, too. They help make sure that nothing is left out.

Draw the following symbols on the board as you explain them, or on a large piece of paper or poster board (with definitions) for permanent display.

1. (Oval) *Beginning or ending symbol.* This means start or stop the action.

2. (Diamond) *Decision symbol.* This tells you to decide what to do next.

3. (Box) *Step symbol.* This contains a description of what you do next.

4. (Arrow) *Direction symbol.* This shows the direction to the next step.

Exercise 4. Making Chart Symbols

Xerox or ditto copies of page 23 of this Teacher's Guide (1 per student) and assemble heavy paper or cardboard (1 sheet per student), glue and scissors *before* beginning this exercise.

Explain to students that they will be making charts in the next several activities, using the symbols that they have just been studying. To make work on the charts easier, it will help to have patterns for drawing the symbols. Tell them they are going to make the patterns now.

Pass out sheets of cardboard or heavy paper (1 per student), duplicated copies of page 23 of this Teacher' Guide (1 per student), scissors, and glue.

Explain to students that they are going to paste the duplicate patterns to the cardboard, let them dry, and cut out the shapes.

Exercise 5. Review

Reproduce and hand out copies of the exercise on p. 24.

When they have finished you may read or hand out the suggested answers on p. 25.

Before going on to the next activity, make sure that students understand the meaning of the charting symbols and the purpose of charting.

Additional Activities

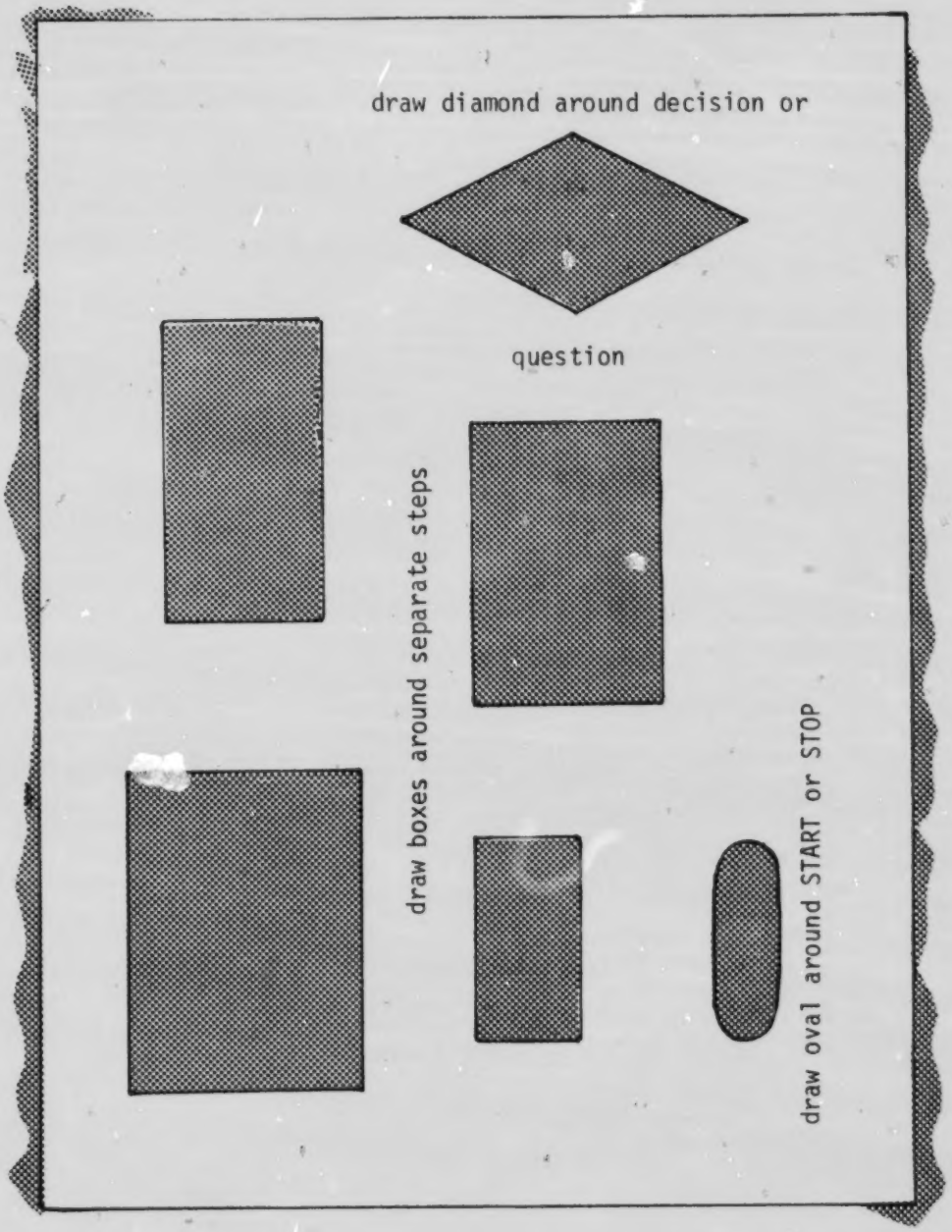
You might wish to discuss additional symbol systems with the students, especially those which are used to describe or illustrate processes or interrelated parts of something. One such set of symbols, of course, is the one used in mathematics (+, -, =, etc.).

Students might also wish to discuss more examples of American Indian symbol or picture writing, or such writing from other cultures.

Additional Resources

Additional resources for this Activity are listed and described on page 111 of this Teacher's Guide.

PATTERN FOR SYMBOLS



Paste this pattern on to heavy paper and then cut out shaded areas.

EXERCISE 5. REVIEW

Do you remember what each of these symbols means? On a separate sheet of paper, draw each symbol. Then write its name and what it tells you to do.

1.

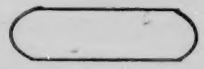
2.

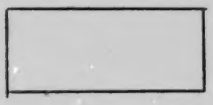
3.

4.

Feedback

EXERCISE 5

1.  Beginning or ending symbol. It means start or stop the action.

2.  Steps symbol. It means write what you do next.

3. Direction symbol. It shows the direction to the next step.

4. Decision symbol. It tells you to decide what to do next.

Activity 2. Making Charts

GOAL: To introduce students to a method of analysis (i.e., charting) which will permit them to break up a job or activity into steps and show the relationship between those steps

OBJECTIVE: The student will order steps in a simple task and then construct a chart (using the symbols) following a given set of rules

WHAT STUDENTS WILL BE ASKED TO DO

- Read directions for making a chart of an activity
- List the steps in a simple activity (sharpening a pencil) and study a chart of that activity
- Study the steps in another simple activity (getting a drink of water) and draw symbols showing the relationship of those steps
- Study charts of somewhat more complex activities
- Make a chart of a simple activity, showing the steps in the activity and their relationship

MATERIALS NEEDED

- *For Exercise 2, 3, and 5:* paper and pencils
- *For Exercise 3 and 5:* students will need the charting-symbol patterns they made in Activity 1

PROCEDURE

You should begin by reviewing the nature and purpose of charts which the students will be making. Since the students will be working with them a great deal in this activity, it is essential that they see the integral part that charting does have when one moves through the process of idea to product. Remind students that these let them take a job or activity apart so that they can see easily the steps in the job and how the steps related to one another.

Explain that in this activity, students will begin by making charts of very simple activities which they already know how to do. By studying and making these simple charts, they can get used to the techniques of charting. Then, in later activities, they can use charts to help themselves understand much more complicated activities, such as those that go on in industry.

Draw the four chart symbols (p. 21 of this Teacher's Guide) and ask students what each symbol is called and what it means (what it tells them to do). If students have trouble remembering the meaning of the symbols, go over the symbols until students have them clearly in mind. Remind students that these symbols are used to show the relationship between steps in a job ("how the steps fit together"). Words describe the steps themselves.

Exercise 1. Reading

Explain that students will now learn the steps for making a chart of an activity. Read the directions for making a chart.

When students have read the directions, go over each step to make sure students understand it. Answer any questions students may have.

The main steps in making a chart are as follows:

1. Decide what job or activity you will chart.
2. Write down the main steps you must do in that job or activity.
3. Decide what order you do the steps in. (What comes first? What comes next? What comes after that?)
4. Decide how the steps relate to each other. (Are any steps repeated? Are there times when you have to ask yourself a question and do one thing or another depending on whether the answer is yes or no?)
5. Put down the steps in the right pattern. (Steps usually run in horizontal rows, reading from left to right and top to bottom, but leave room for "side branches" etc. where appropriate.)
6. Decide which symbol you should draw around each step. Then use your patterns to draw the symbols.
7. Put in arrows to show the direction of each action. (This may not always be forward. For instance, if a step or set of steps is repeated, the arrow will point backward to show this.)

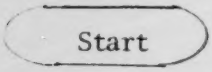
EXERCISE 1. READING

In this Activity, you will learn how to use the symbols from the last Activity, along with words, to make charts that show how the parts of a job fit together.

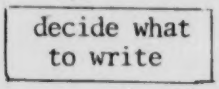
The main steps in making this kind of chart are always the same. Here they are.

1. Decide what job or activity you will chart.
2. Write down the main steps you must do in that job or activity.
3. Decide what order you do the steps in. (Which comes first? Which comes next? What comes after that?)
4. Decide how the steps relate to each other. (Are any steps repeated? Are there times when you have to ask yourself a question and do one thing or another depending on whether the answer is yes or no?)
5. Put down the steps in the right pattern.
6. Decide which symbol you should draw around each step. Then use your patterns to draw the symbols.
7. Put in arrows to show the direction of each action.

Before going on to Exercise 2, you should draw on the board some examples of simple charts and discuss these with the students, step by step. For instance, you might begin with a chart for the action of writing on the board. Ask students if anyone remembers what symbol is used to start off a chart. If no one does, remind students yourself. Draw the symbol on the board--



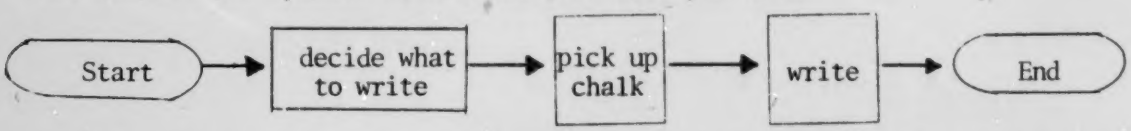
Now explain that the first step in writing on the board is to decide what to write. Show this step inside a box symbol, like this-



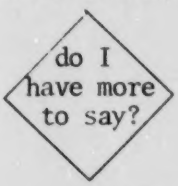
The second step is to pick up chalk--

And the third is to write--

Now connect the symbols with arrows, so that you have--

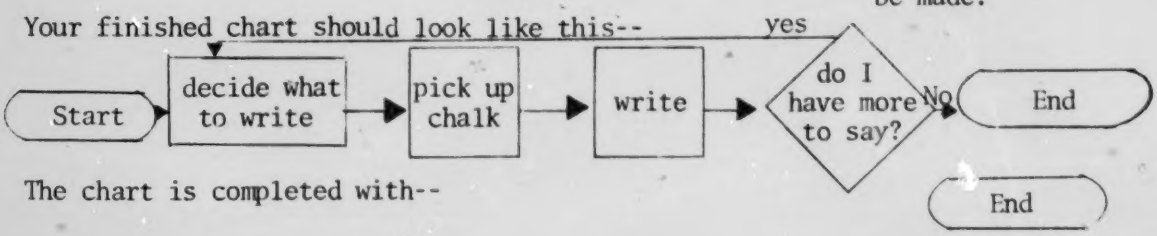


Now ask, "What if I want to write something more?" This can be shown by adding --



using the diamond symbol that indicates a decision must be made.

Your finished chart should look like this--



The chart is completed with--

You may wish to do charts for other simple activities before you go on to Exercise 2. Some other possible activities are (a) opening a door; (b) feeding a pet; (c) turning on a television set (including getting the right channel, etc.).

Exercise 2. Listing Steps How to Sharpen a Pencil

Explain to students that the first action they will practice charting is the act of sharpening a pencil. In connection with this exercise and the following ones, be sure students understand that neither you nor the book is making fun of them. You know they know how to sharpen a pencil. Tell them that by starting with activities they know how to do, they will have an easier time learning the unfamiliar activity of charting.

Ask students to divide into their workgroups. Make sure they have paper. Then tell them to write down the steps involved in sharpening a pencil. They should write down as many steps as they can think of. The can take turns actually getting up to sharpen a pencil, if they want to.

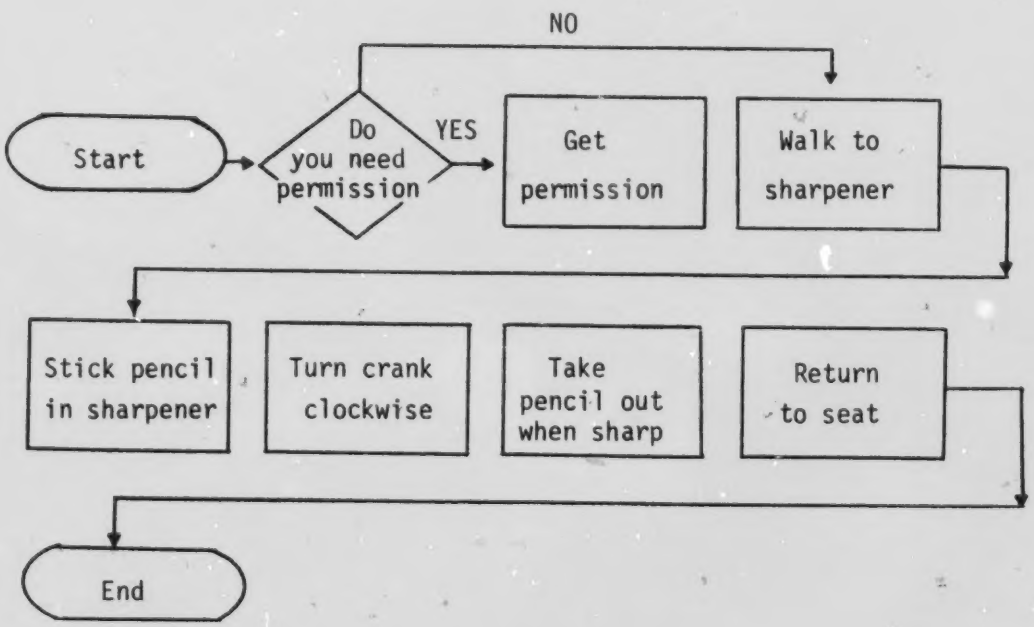
When the individual students have finished their lists, tell them that the members of each workgroup should compare their lists and come up with a joint list. Give them as much time as they need to do this, and help them if necessary.

After they have worked out their lists, hand out or write on board the possible list of steps for sharpening a pencil and a chart that could be made of those steps (on the next page). Go over this chart with the students. Make sure they understand why each symbol is used in the place it is. Point out that the steps are listed in sequence, just as they would be in a written description, can show what *kind* of step each one is (whether it involves a decision, for instance) and whether a step or steps is optional. For instance, the arrow shows that the step of getting permission is optional, depending on the decision made in the previous step. If permission is not required, the arrow shows that they can skip this step.)

How to Sharpen a Pencil

a. Ask if you need permission
b. Get permission
c. Walk to sharpener
d. Stick pencil in sharpener
e. Turn crank clockwise
f. Take pencil out when sharp
g. Return to seat

A chart for those steps would look like this:



Exercise 3. Using Chart Symbols: How to Get a Drink of Water

To prepare for this Activity, duplicate copies of *How To Get a Drink of Water* on page 33 in this Teacher's Guide. Make sure there are enough copies for the whole class.

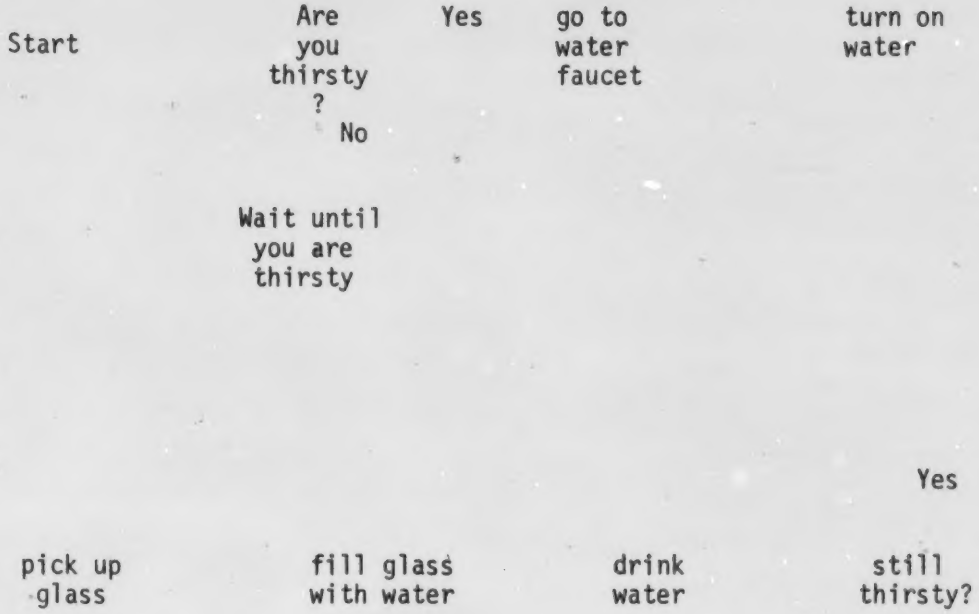
Explain that getting a drink is another activity which you know they know how to do, but which has more steps in it than sharpening a pencil does. Distribute copies of *How To Get a Drink of Water*. On this worksheet, they will find the steps for getting a drink of water. Discuss the steps to make sure students understand them. Ask, "Do you think any steps are missing? Do you see any steps which you think are not necessary?"

Now say something like, "The steps for getting a drink are all there, but the chart isn't finished. What is missing?" Elicit the idea that the symbols, which show the relationships between the steps, are missing. Tell the students that they will have a chance to use the patterns they made in Activity 1 to put in the symbols on this chart.

Instruct the students to use their patterns to fill in symbols around each step. Tell them to use a pencil, not a pen. Tell them to put in arrows where they are needed on the chart.

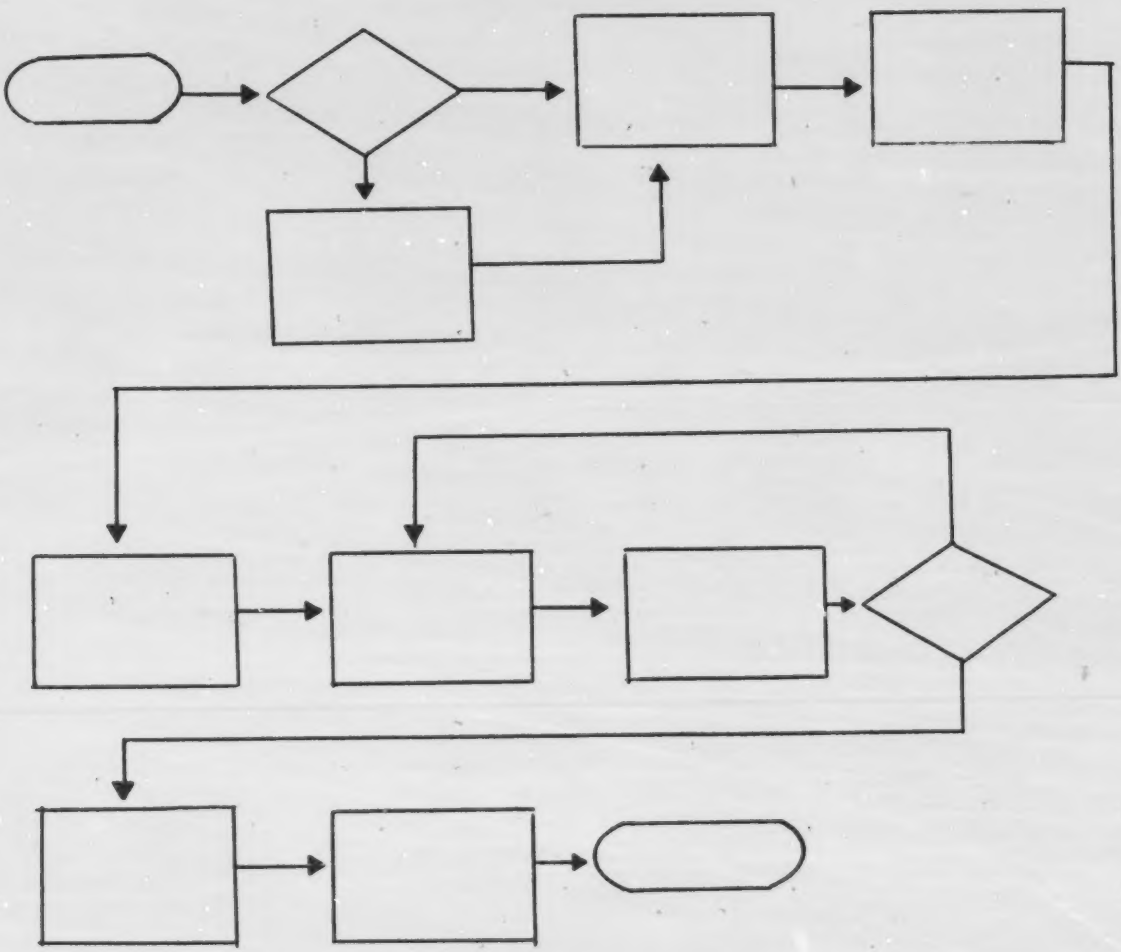
When students have had plenty of time to try filling in the symbols, pass out copies of p. 34. There they will find the symbols that go with the drink chart, without the words. Tell them to compare the symbols they used with the ones shown on this page (the symbols are given in an order that matches the steps on the worksheet page). Ask them to correct the charts they made if they find any mistakes. As students work, circulate around the classroom and answer any questions they may have about why certain symbols are used in certain places.

Part 1: How To Get A Drink of Water



Part 2: Symbols

These are the symbols which should be drawn around the steps in Part 1.



Exercise 4. Looking at Charts

Tell students that they are going to see some charts of more complex activities before they make charts of their own. Reproduce and hand out, copy on the board or on poster paper, or show on an overhead projector the charts on pp. 36-37 of this book. The first one shows how to buy a hat, and the second, how to change a tire.

If your students have been having a lot of trouble with the ideas involved in charting, you might want to go over each of these charts step-by-step with the whole class, making sure that students understand the steps and why the symbols and arrows are arranged as they are. If most students seem to have been getting the idea of charting pretty well, you can leave the majority to study on their own for ten or fifteen minutes while you answer the questions of those students who are still having trouble.

To check student understanding, you might ask questions such as, "What does the first chart say to do if you don't like the hat you pick out, or it doesn't fit, or it costs too much?" (Pick out another hat -- Point out that arrows from the "no" angle of all three diamonds point back to this step.) In the second chart, what step does the arrow tell you you can skip if your car doesn't have hubcaps?" (skip step--"Take off hubcaps").

Make sure students understand these somewhat more complex charts and the ways the symbols are used in them before you go on to the next exercise.

An optional transitional activity between exercises 4 and 5 is to have some of the more dramatic students act out a series of (actions), and discuss with the class how to chart them. In addition to providing a lively half-hour or so, this activity can also be used to point out how different people looking at the same event may see it very differently.

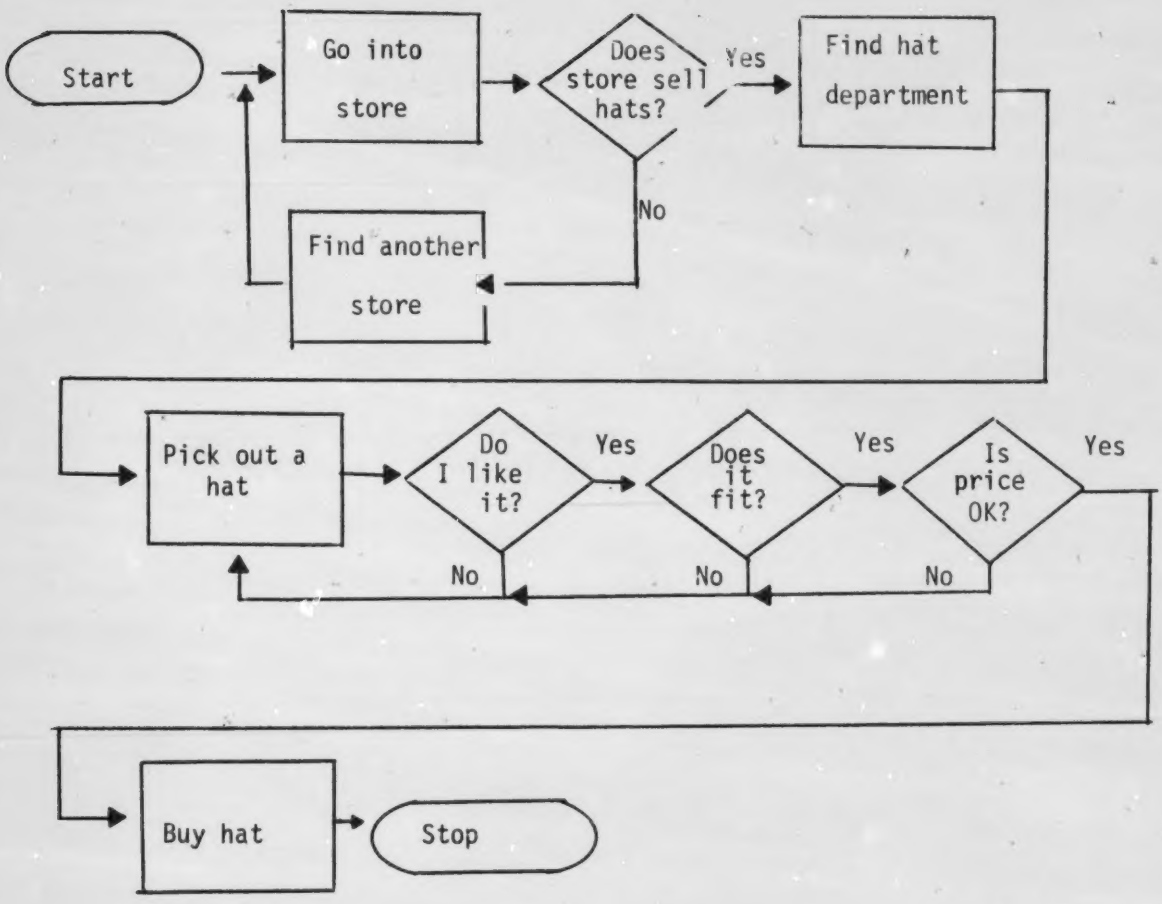
Exercise 5. Making a Chart

When you feel that students understand the principles of charting, reproduce and hand out, or write on the board the list of activities on p. 38 of this book (you may add other activities you feel would interest students). They should choose one of these activities and using the steps listed at the bottom of the page as reminders, draw a chart of one of them.

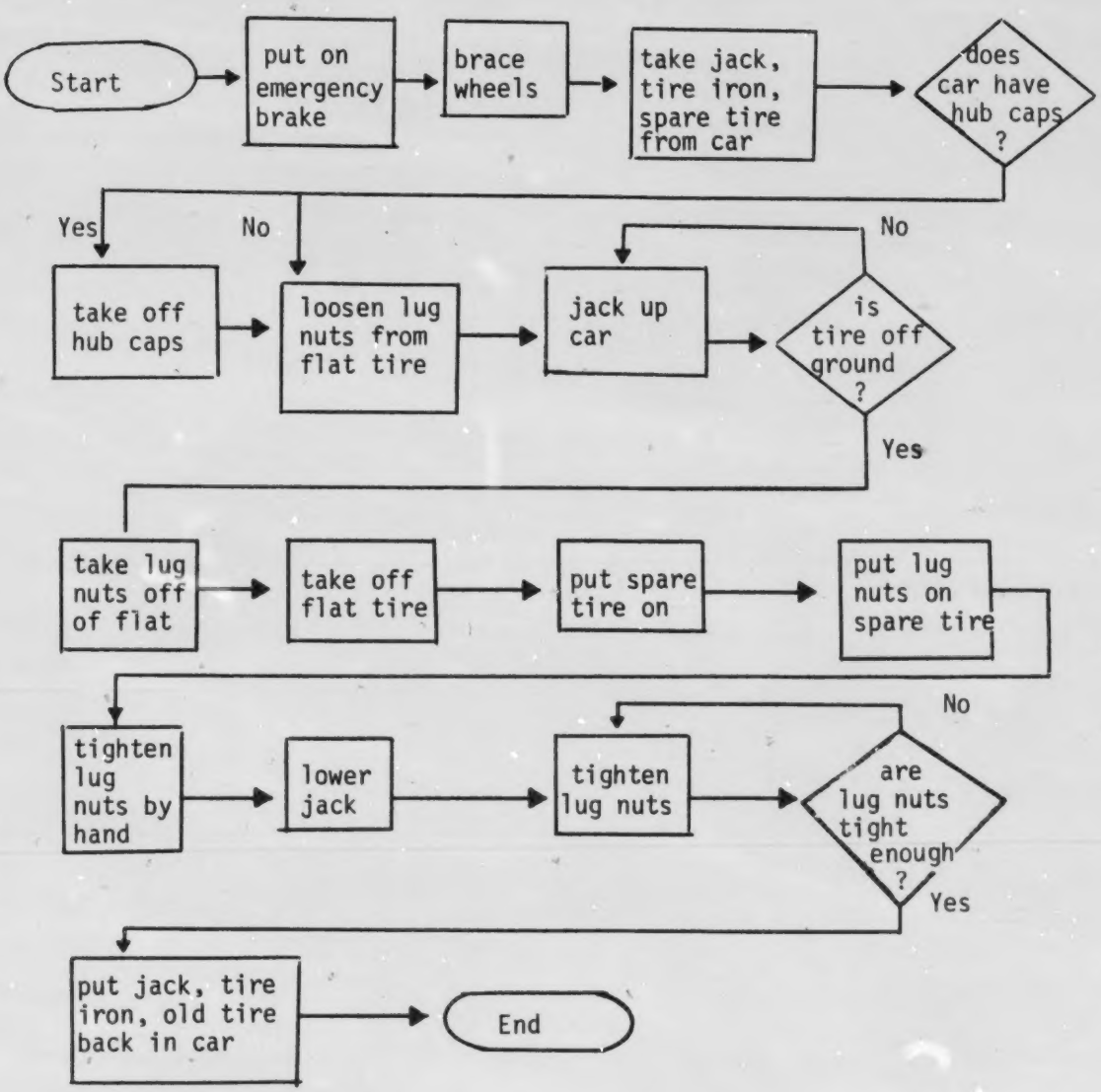
Students may do this exercise individually in class or as homework, or in workgroups. If they do it in class, circulate among them to give help as needed. Students who finish quickly should be encouraged to help those who are having difficulty. An example of a finished chart for making a call from a paid telephone is included on p. 39.

If students run into too much difficulty, you might try an interim step of making a picture chart. An example made by a class at Ganado, Arizona, appears on p. 40.

A. How to Buy a Hat



B. How to Change a Tire



EXERCISE 5. MAKING A CHART

Look at the following list of activities and choose one to make a chart for.

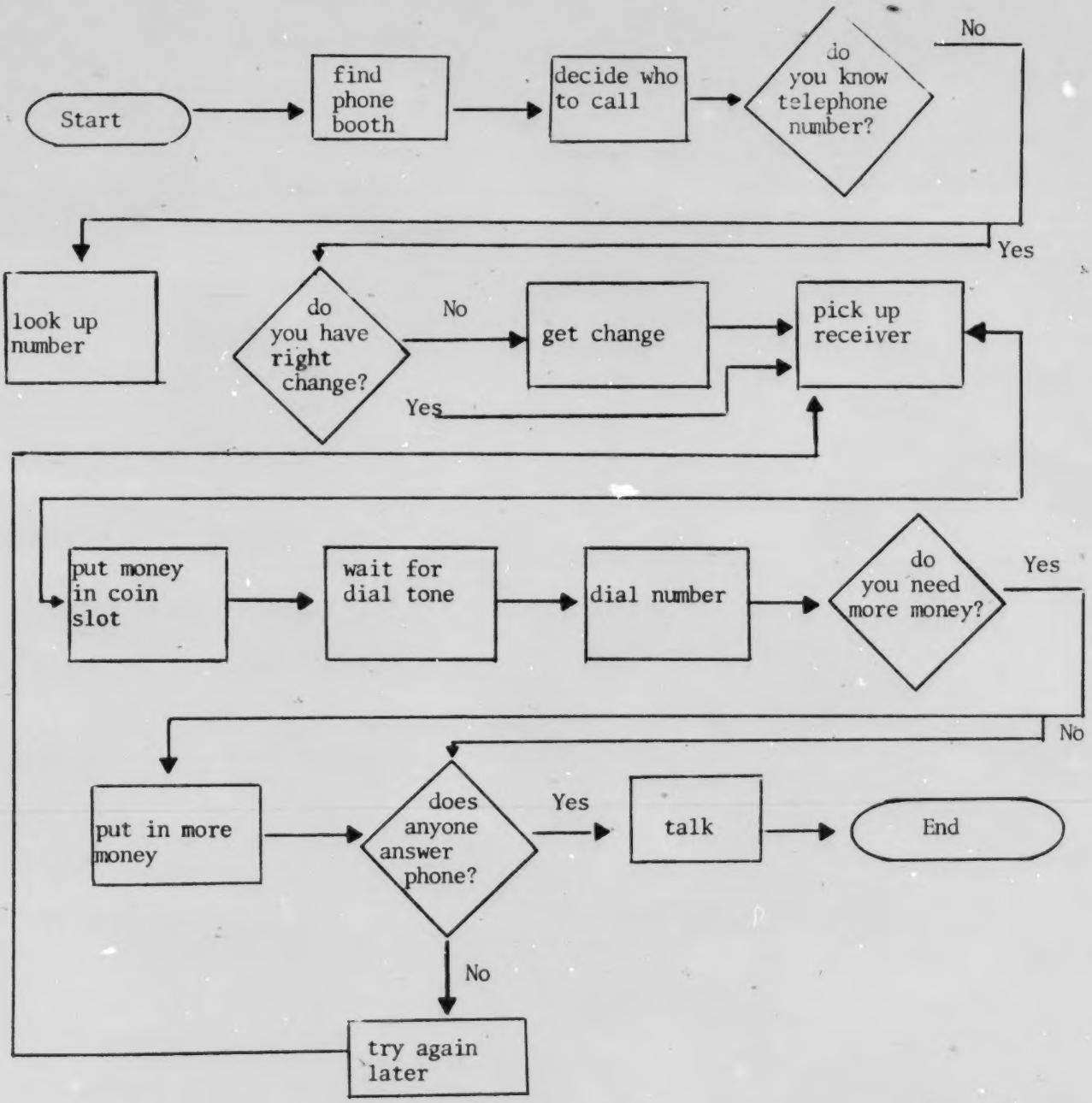
1. how to catch a fish
2. how to draw a picture
3. how to make a telephone call from a pay phone
4. how to saddle a horse
5. how to take out a book from the school library
6. how to buy a tube of toothpaste
7. how to find a place in a strange town
8. how to set up a loom
9. how to put on make-up
10. how to kick a football

Remember to follow these steps when you make your chart.

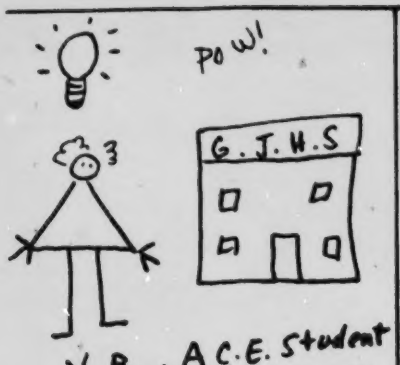
1. Choose an activity to chart.
2. Write down the main steps you must do in the activity.
3. Decide what order you do the steps in.
4. Decide how the steps relate to each other. Notice whether any of them depends on a "yes" or "no" answer to a question, whether any of them is repeated, and so on.
5. Write down the steps in the right pattern.
6. Outline each step with the symbol that shows what kind of action it is.
7. Put in arrows to show the direction of each action.

Use your patterns to draw the symbols.

CHART FOR MAKING A CALL FROM A PAY TELEPHONE



PLAN FOR A TRIP



V.B., A C.E. student

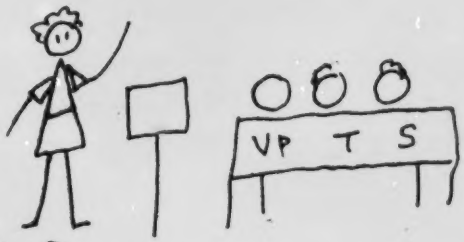
An idea:
A trip to Phoenix
1. by the C.E. Class.

"Good idea."

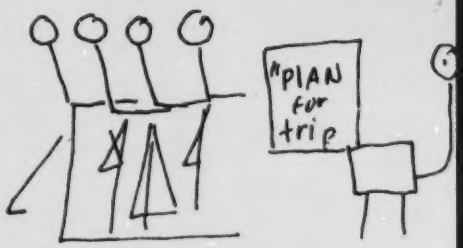
Mrs P. (Provoorse-Teacher)

"No Money!"

"We will raise the money."

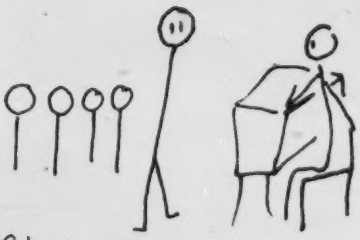


P.
HOW? "We will elect officers."



Student officers

Counselor



Student officers with counselor

PRINCIPAL

PRINCIPAL SUPERINTENDENT

"Hurray! we made some money!"

Additional Activities

If possible, this activity should conclude with the application of the students' chart-making skills to some craft project which they do themselves. This will help them make the transition between charting of activities in which they make something and charting activities in which something is made by someone else. This can be an on-going activity on which students will spend some time each period for the rest of the unit.

Because of the information on lumbering and furniture-making included later in this unit, a project which uses wood would be very appropriate. If arrangements can be made to use the school wood-shop's equipment, both boys and girls might begin constructing some simple object. One possibility would be a cradle-board, as described in Activity 3, or even a crib (see Activity 5). Some simple piece of furniture or equipment which could later be used in the classroom or elsewhere in the school would also be suitable.

If a project using outside facilities is not possible, some activity which can be done in the classroom should be substituted. Possibilities include beadwork, cooking, paper-mache sculpture, kite-making, etc. Any activity that produces an object and requires several different kinds of actions is appropriate.

Students with special interests could work on projects of their choice, or workgroups, or the entire class, could help with a joint project. As always, students should be encouraged to help each other. However the activity is managed, it should be charted as it is being done. Completed charts and products could be displayed together.

(A variation on this idea would be to have each student chart how to do something and then try to do it, following only those steps previously charted. If he or she has left any step out, they must be added to the original chart in red. At the end of the activity, it should be clear how well the student was able to anticipate what needed to be done.)

Another additional activity would be a discussion of the problem-solving advantages of charting. To do this, ask students to describe tasks they have had trouble doing, or problems they have had trouble solving (for instance problems in math, science, or some other school subject). Then the class as a whole, or individual workgroups, can draw up charts showing the task or problem. The chart might illustrate the steps in the activity itself or the steps to take in solving the problem, depending on the nature of the example. For instance, what steps would one take to "troubleshoot" a piece of machinery which has broken down? The process of breaking the activity into related steps to make the chart should help students understand it better, or pinpoint the part of it which is causing the trouble.

Activity 3. Meeting A Need Step by Step

GOAL:	To help students recognize the basic steps in making a product
OBJECTIVE:	Students will study the making of a product by one person and will identify the basic steps involved.

WHAT STUDENTS WILL BE ASKED TO DO

- Read a story describing the making of a cradleboard by a Navajo man
- Extract from the story the steps involved in making a cradleboard, and make a chart showing those steps
- Extrapolate from the steps in making a cradleboard the basic steps in making any product.

MATERIALS NEEDED

- *For Procedure:* cradleboard or pictures of a cradleboard (optional)
- *For Exercises 2 and 3:* paper and pencils
- *For Exercise 2:* students will need symbol patterns made in Activity 1

PROCEDURE

Explain to students that when families or small groups of people live together far away from others, they have to make almost everything they use themselves. If someone needs something, he has to figure out where to get the raw materials to make it. He has to decide how to prepare them and how to use them to make the thing he wants. Only when he has gone through all these steps can he become the user of the thing he has made.

In this Activity, they will read about a man who builds a cradleboard for his child. They will find that the steps this man goes through are very much like the steps which would take place during the making of any other kind of thing to be used.

Ask if students have ever seen a cradleboard, or if they know what a cradleboard is and what it is used for. If either you or any of the students have access to a photograph of a cradleboard or, better still, the real thing, bring this in and share with the rest of the class. If a cradleboard or photograph is obtainable, or if students have seen cradleboards, ask "What is a cradleboard made of?" Have them name as many of the different materials (kinds of wood, beads, cloth, etc.) as they can. Ask, "How do you think a cradleboard is made? What steps might a person go through in order to make one?"

If students are not familiar with cradleboards, tell them that cradleboards are holders used by some Native American tribes to keep older babies in so that the babies can't crawl away or hurt themselves. Explain that in this Activity, students will read about the way a Navajo man makes a traditional cradleboard. Then they will use the charting skills which they developed in the last Activity to make a chart that shows the steps in making a cradleboard.

Point out that the man's making a cradleboard is an example of a single person deciding that he or she needs some physical thing, and then setting out to make it or produce it by him- or herself. Ask students if they have ever decided they wanted something and then set out to make it or grow it themselves. (Have any of them made their own clothes? grown vegetables? made some craft object? etc., use examples from the class project if possible).

If students can think of examples of making something themselves, discuss the examples briefly. Try to have them pinpoint the steps they went through in making the objects, from the time they first thought of what they needed to the time they ended up with a finished product. If possible, have students work out charts for one or two such examples; probably you should write the charts on the board, working from class suggestions. If students made charts connected with a craft project as suggested in the Additional Activities section for Activity 2 (page 41 of this Teacher's Guide), you might want to refer to those charts now.

Exercise 1. Reading (The Cradleboard)

Reproduce and hand out copies of the story on pp. 45-50 to the class, or read it aloud and make one copy available to each workgroup. Explain that who made the cradleboard varied from tribe to tribe. In some tribes it was the mother, but among the Navajo it was the baby's uncle, grandfather or father.

Exercise 2. Steps in Making a Cradleboard

When students have finished the cradleboard story, instruct them to make a list of the steps involved in making the cradleboard, from the time Billy thinks about needing a cradleboard to the time the baby is set in the finished board. They should write down everything Billy does that contributes directly to making the board. Emphasize that all the information they need is in the story. Refer them to the list of steps in making a chart they used to do Exercise 5, Activity 2.

When students have finished making the list of steps, they are asked to arrange the steps into a chart like the ones they made in Activity 2. They should use the symbol patterns they made in Activity 1 when they are making the chart. Be sure they have paper for their lists and charts.

If your students seem likely to have trouble with this exercise, you might want to do each part separately. First, give students time to do the list of steps in making the cradleboard. They should work on this individually for 15 or 20 minutes and then consult other members of their workgroup. You might now want to discuss the list of steps before students go on to making the chart. Write the steps on the board as class members suggest them.

The exact steps and the wording used by the students will, of course, vary. However, at least the following basic steps should be included in any list. Don't worry if students include more steps than these. However, if any of these basic steps are missing from their lists , refer them to the place in the story where each missing step is described and have them correct their work.

decide what to make
find kinds of wood needed
cut wood and bring it home
cut out main pieces
soak wood
sand and smooth pieces, burn holes
put pieces together
add padding, cover, lacings, etc.
decorate
give to baby's mother

Once students more or less agree on a list of steps for making the cradleboard, they can go on to making the charts. If necessary, review orally the steps in charting. Or if students have had relatively little trouble with charting, have them read this review for themselves. You might want to make another sample chart or two, or refer students back to some of the samples,in Activity 2. Depending on how well your students have mastered charting, they might finish both the list of steps and the charts in one class period, or you might want to do the steps in class and assign the charts for homework.

You will probably want to collect the finished charts and go over them. A sample of a finished chart appears on page 51 of this Teacher's Guide.

After students have finished their charts and have had a chance to look over any corrections you made, you should draw a sample chart on the board and go over the steps and symbols with the class as a whole. This would be especially useful if many students had trouble with the assignments.

THE CRADLEBOARD

Billy Whitesheep sits under the shade house near the hogan where he lives with his wife and her family. Billy is repairing a saddle. The soft light of sunset falls across the desert, touching the snow-covered mountains in the distance with rose. Nearby the sheep have been penned for the night. Billy can hear them moving around and maa-ing softly.

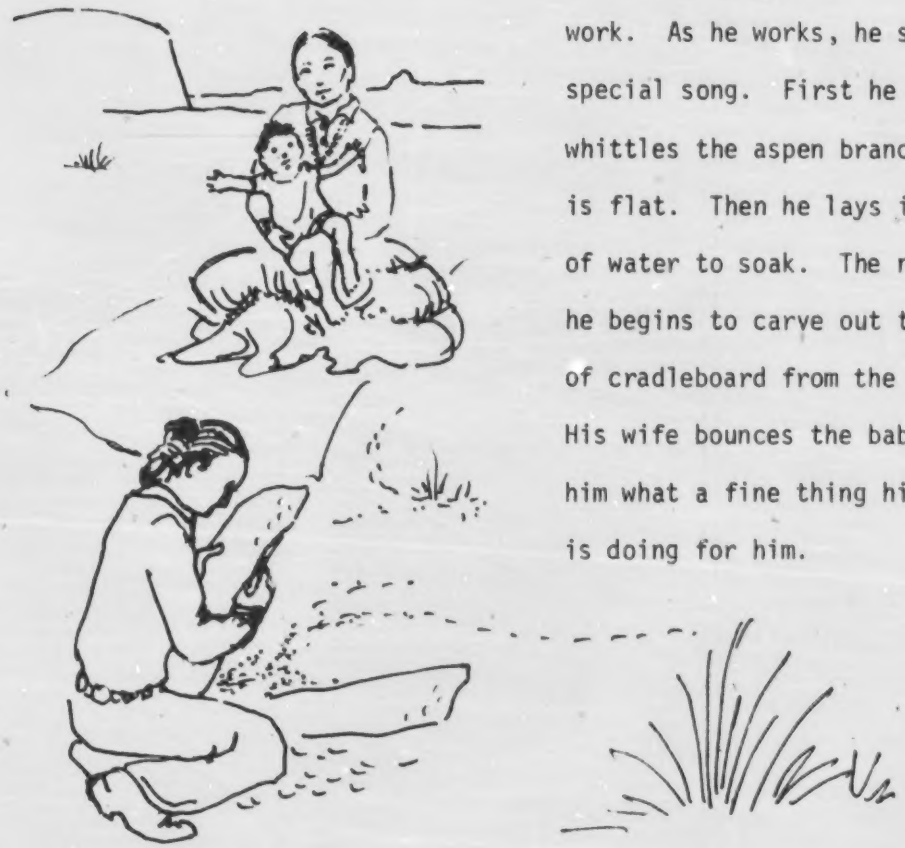
Billy's wife Linda comes out of the hogan and lays the baby down on a blanket. Then she begins to put away the pots she used to cook dinner. Her mother has already gone back to weaving at her loom nearby. The baby gurgles softly to himself and waves his arms and legs in the air. He rolls around until he is nearly off the blanket.

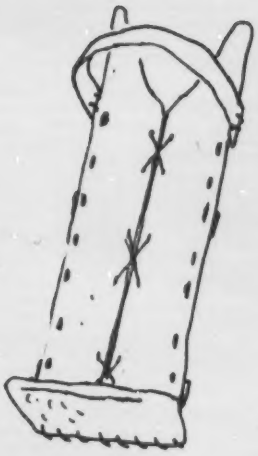
The baby will be crawling soon, Billy thinks. *It's time I got busy and made him a cradleboard.* He sits still, remembering the cradleboard his mother used for him and all his brothers and sisters. He thinks about what he must do to make one like it. But his mother-in-law is looking at him as if she were wondering why he is not busy, so he gets back to work on the saddle.

The next day, as he is taking the sheep to water, Billy notices a big pine tree. It has blown over in one of last winter's storms. He goes over to look at it. He checks it carefully to make sure it has not been struck by lightning. He finds that it has been lying long enough to be well seasoned, and one of the limbs has been torn off. Billy studies the limb. Is there enough wood there for a cradleboard? Billy thinks there might be. On his way back he drops his lasso over one end of the pine log. He drags it home after him, even though his horse doesn't like the extra weight.

But the pine wood will only do for some parts of the cradleboard. Billy will have to wait until the next week when they go up into the hills again. Then he can find and cut a branch of green aspen to use for the cradleboard's headguard.

Billy finds his aspen branch in the hills, just as he expected. When they get back, Billy starts work. As he works, he sings a special song. First he cuts and whittles the aspen branch until it is flat. Then he lays it in a tub of water to soak. The next evening he begins to carve out the pieces of cradleboard from the pine log. His wife bounces the baby and tells him what a fine thing his father is doing for him.





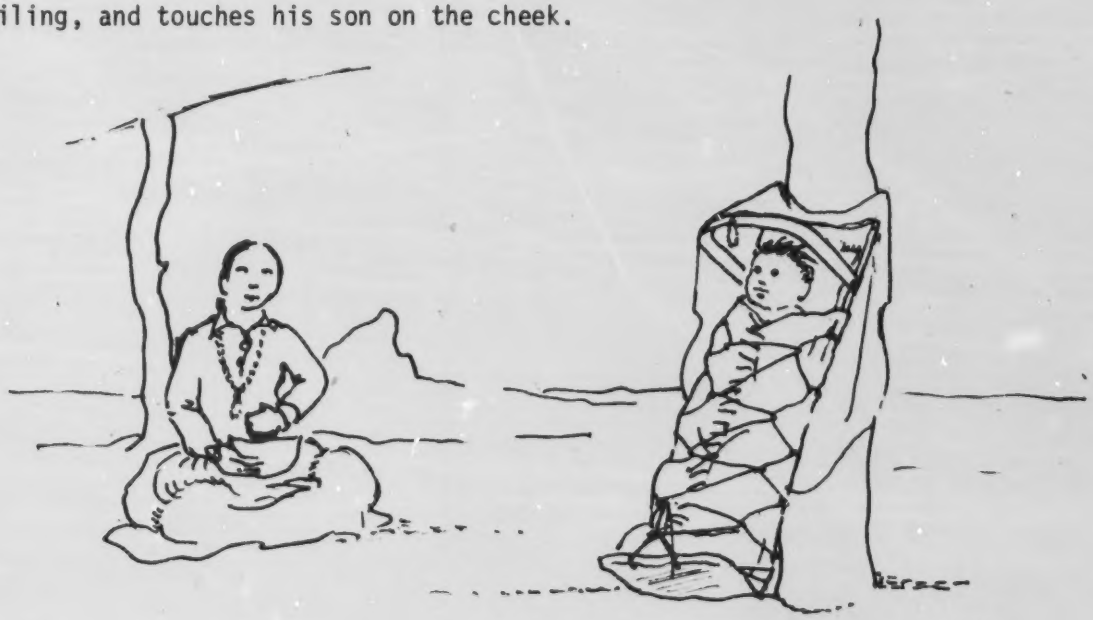
It takes several days before all the pieces are done, since Billy is very busy helping with the work of the camp. But finally he reaches the last steps. He heats a piece of iron and burns holes around the edges of the wood. These holes are for the laces that will hold the pieces together. Then Billy takes the piece of aspen that has been soaking and laces it to the pieces of pine. It is soft now and bends into a hoop that will protect the baby's head. This curved hoop also stands for the rainbow.

But the cradleboard isn't done yet. Billy takes the skin of a buck he shot the year before and which Linda has nicely tanned. He cuts out pieces of the hide for the cradleboard cover. He makes slits in the cover so that it can be laced on. The buckskin pieces represent the lightning, and the strings that lace it on stand for the rays of the sun. Another piece of buckskin is got ready to drape over the top of the cradleboard. This represents darkness. Linda shows him a tiny rug which her mother has been weaving. It will go over a piece of sheep skin to the board. He puts the rug on the board. Then he takes a piece of Pueblo cotton, gathers it at the top, and attaches it to the board. This will be the sheet in which the baby is wrapped.

When the cradleboard is finished, Billy dabs red sand mixed with sheep's fat on the wood parts. This is to protect the baby from any evil that is around.

Finally, Billy takes a little string of turquoise and shell beads and attaches them to the hoop. He could also use cedar seeds. These make the cradleboard look prettier. They will also help protect the baby from harm. A porcupine guill is tied on to protect the baby from bears and other mountain animals.

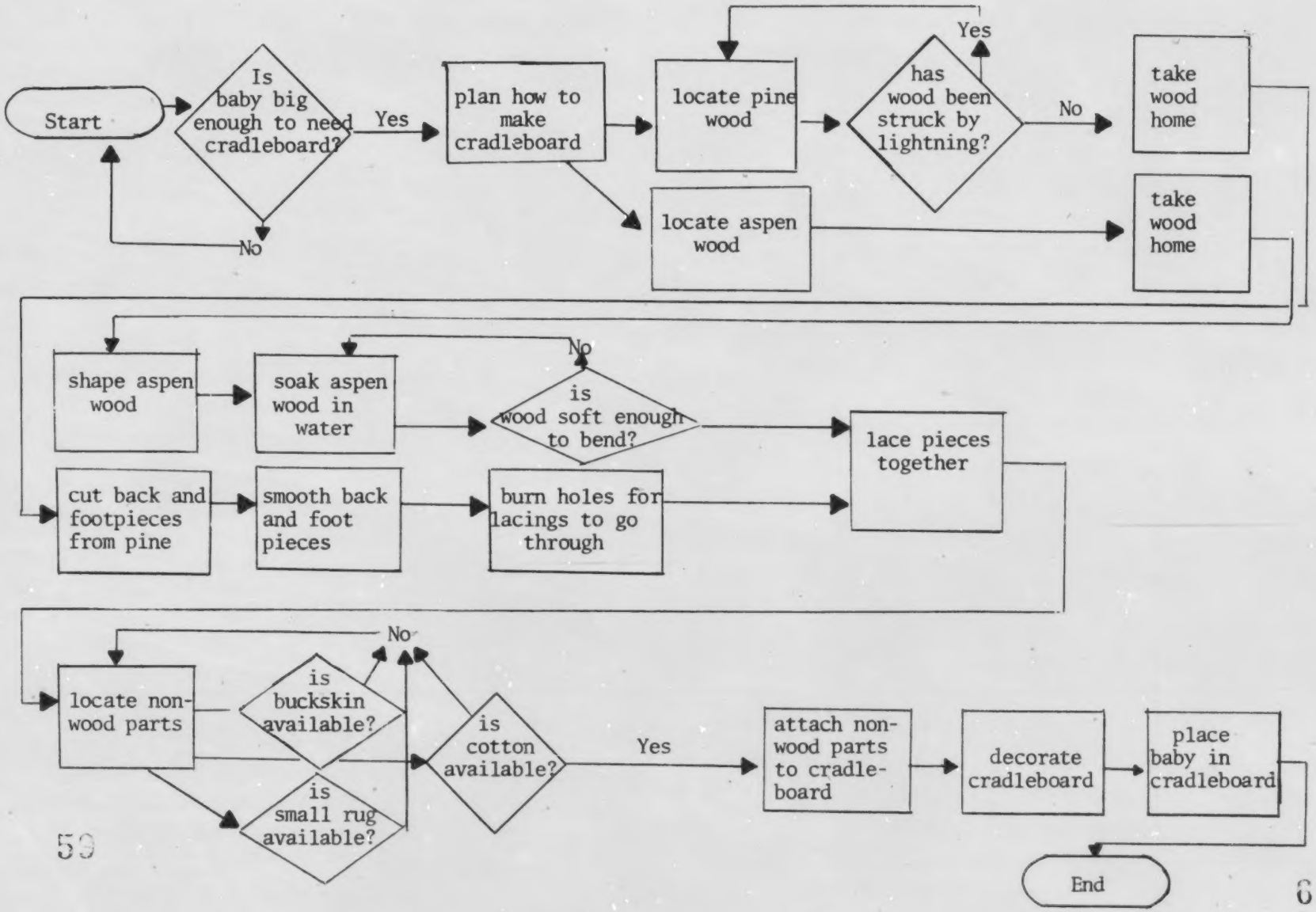
Now the cradleboard is ready. Billy makes sure it is all in order. Then he gives it to Linda. She sprinkles cover pollen over it to bless it, then she puts the baby in it and laces up the cover. Then she leans it against the post of the shade house so that the baby can see everything that is going on. The baby seems to feel very secure and safe in the cradleboard. He watches his parents with bright eyes. Billy is very proud. He leans forward, smiling, and touches his son on the cheek.



The baby looks and laughs. "He laughed!" cries Billy. "His first laugh!" "Mother--" says Linda, "listen, our baby is laughing!" "Hurray!" cries Linda's younger sister Mary. She is thinking of the party that is always given to celebrate a baby's first laugh.

Since Billy is the person who made the baby laugh, he will have to pay for the party. But he isn't worrying about that. Billy is looking at his son in the cradleboard that he made, and he is laughing too.

HOW TO BUILD A CRADLEBOARD



Exercise 3. Steps in Making Any Product

When students have finished their charts and you have corrected and discussed them, ask them to take a piece of paper and list the ten main steps that they would take to change something from its original state to a form in which it can be used. They should start with a raw material, such as a tree or a cow, and end with the item that it or parts of it are made into (house, table, boots, hamburger, etc.) However the steps should be described in terms which would apply to almost anything-- "find or plant raw material" etc.

After students have made their lists, they should discuss them with other members of their workgroups until everybody agrees on the steps. When they are done, read aloud, and write on the blackboard or a poster the following steps (their equivalents in the cradleboard story are given at the right):

1. find or plant raw material	*--locate pine and aspen branches*
2. harvest the raw material	*--cut branches and bring them home*
3. rough process (begin to prepare materials)	*--flatten aspen branch*
4. finish process (finish preparing materials so they are ready to use)	*--whittle and soak aspen branch*
5. design (decide just what to do with materials	*--occurred at beginning of cradleboard story but happens here in the industrial process*
6. make main pieces	*--cut pieces from pine branches*
7. put main pieces together	*--assemble cradleboard*
8. add extra parts	*--add padding, cover, strings, etc.*
9. decorate	*--add red color, beads, quill, etc.*
10. sell or use	*--put baby in cradleboard*

Since this exercise requires students to generalize from the particular example to the general statement, you should go over each step carefully. Ask students to identify the action in the cradleboard story which corresponds to each step. Give other examples of general statements ("Jane smiles, Terry says hello = making friends").

Make sure students understand what each basic step means. Have them copy them down from the blackboard and keep them in their notebooks. They will need to know them for the next two activities, in which they will see how these same basic steps apply to a product made in industry by many people.

Additional Activities

If students have made charts for doing a craft activity or making some project in connection with the end of Activity 2 or the beginning of Activity 3, have them refer back to these charts and identify the steps in making their particular item which correspond to the basic steps in making any product. (Note that there may not be an equivalent for all the steps.) If students did not make a chart for such an activity, you might wish to have them do so now.

Additional Resources

Additional resources for this Activity are listed and described on page 111 of the Teacher's Guide.

Activity 4. Splitting Up The Work - Part 1.

GOAL:	To help students understand the first steps in making a product (harvesting and processing raw materials) in a technological setting, involving different people doing different jobs.
OBJECTIVE:	Given four manufacturing categories, the student will classify lumber industry job titles; construct a chart of harvesting and processing raw materials in the lumber industry; and classify manufacturing activities as either harvesting or processing.

WHAT STUDENTS WILL BE ASKED TO DO

- Read an article describing how wood is harvested and rough-processed in the Woods Operations of the Navajo Forest Products Industry
- Answer review questions about the article
- Read an article describing the finish processing of wooden boards in the sawmill of the Navajo Forest Products Industry
- Classify job titles, taken from the articles, into general categories
- Make charts showing the steps in turning trees into logs and logs into finished boards
- Divide other activities into the categories of Harvesting and Processing

MATERIALS NEEDED

- *For Exercise 1:* Slide-tape on Woods Operations of the Navajo Forest Products Industry* (if available)
- *For Exercise 3:* Slide-tape on sawmill of the Navajo Forest Products Industry* (if available)
- *For Exercises 2, 4, 5 and 6:* Pencils and paper. For Exercise 5, students will need the charting-symbol patterns they made in Activity 1.

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*See page 153 of this Teacher's Guide for information.

PROCEDURE

Remind the students that in the last Activity they talked about the steps involved when something was made by one person. Then ask, "What do you do when you want something that you can't make yourself? How do you get it?" Ask them to name some products they've gotten recently which they or their family did not make themselves. You might want to write the names of some of these products on the board. Then ask, "How do you think these things were made? Who made them? Did more than one person work together to make them?"

Probably most of the things they name will have been made by many people in a factory or industrial setting, using machines and producing many copies of the same object at the same time. Bring out these facts. Explain that this is how most things are made in America, and in many other countries (especially those of Europe and the Soviet Union) today. You might give some more examples of familiar products which are made in this way.

Discuss the advantages and disadvantages of this assembly-line or technological way of doing things. Ask, "What are some of the good things about making products using many people and machines, instead of each person or each family making what they need by themselves? What are some of the bad things about making things in big groups like this?"

Give students time to discuss their own ideas about these advantages and disadvantages. Also, during the discussion, bring out these points: Assembly-line or industrial ways of making things can let people use their time more efficiently so that more products are produced and more people can have more things for less money. They also let people divide up work so that no one person has to be good at a great many things, and they let people use processes and machines which would be much too complex to be handled by one person. These are some of the advantages of the industrial or technological method.

On the other hand, assembly-line work does not usually allow products to be tailored to fit individual needs exactly, as a person can do when he makes his own things; and the assembly-line or factory worker, making only a small part of a product over and over, rarely has the personal satisfaction of someone who has made something from start to finish and can then look at the completed object and say, "I made that." These are some of the disadvantages of the technological method.

Remind students that in the last Activity they studied a cradleboard and how it was made. Then ask, "What do people in the city use to keep a baby from crawling around, getting in the way or hurting itself?" Bring out the idea that they use a playpen. Ask, "How do you think a playpen is made? Does each family make its own playpen, the way Billy made a cradleboard for his son, or does someone go out and buy the pen? If the family doesn't make its own playpen, who does make it?" Elicit the idea that a playpen is another industrially made object such as those they have been discussing. Usually many playpens are made at once by many people doing a variety of different jobs and running different machines.

Tell students that in this Activity and the next, they will be learning how a playpen is made. They will have a chance to see ways in which the making of a playpen is different from and ways in which it is like the making of the cradleboard they studied in Activity 3. At this point you may want to remind students of the ten basic steps in producing something which they worked out at the end of the last Activity. Write these steps on the board. (They're

listed on page 52 of this Teacher's Guide.) Tell students that they will find that these steps are used in the making of a playpen, just as they were in making of the cradleboard. You might remind them what each of the basic steps consisted of in making a cradleboard, and ask what they think the same steps might consist of in making a playpen. Finally, tell students that in this Activity they will be dealing with only the first few steps in the process--the ones needed to turn trees into boards.

Students need to see the total picture of this long process. Write the main headings of the exercises on the chalkboard before they begin them so they can see the sequence of these general processes.

Exercise 1. Reading

Explain to students that in the last activity they saw the main steps involved when a single person was making something for himself or his family. These same steps are also used when different people and groups work in connected jobs to make industrial products.

In the desert, the Navajos use cradleboards to keep their babies safe. In the city, people often use playpens for the same purpose. In the last Activity students saw how a cradleboard was made. In this one and the next they will see how a playpen is made. It takes many people doing different jobs to make a playpen. First wood must be cut and shaped into boards. Then the boards are shaped and put together in a furniture factory. In the activity, students will learn how wood is harvested and made into boards. In the next activity, they will see how those boards become playpens.

If a copy is available, show the class the slide-tape on the Woods Operations of the Navajo Forest Products Industry (see p.111 for information on how to obtain this). A transcript of the narration for the slide-tape is included on pp. 57-59 of this Guide. You should review the transcript before showing the slide-tape. Change slides whenever you hear a beep on the tape or see a new slide number on the transcript.

Before showing the slide-tape or reading about the Forest industry, have students list on the blackboard all the occupations they think might be involved in this process. Have one student count all the occupations mentioned in the slide-tape as it is shown. Afterwards, compare the two lists.

After students have seen the slide-tape, or immediately after your introduction of the exercise if it was not available, hand out copies of pp. 60-63 for them to read. You may choose to read this material to them instead, but some copies should be available to workgroups for later reference. The reading summarizes the content of the slide-tape. Direct students to make note of the many different people and jobs involved in the woods operation.

A point which should be considered during this activity is the scarcity of woman workers in the lumber industry. No women appear in the slide-tape on lumbering, and only in one section of the sawmill tape. This is an accurate representation of the situation in the company being pictured. The question which is being asked these days is whether it has to be that way. You might ask students to suggest reasons why women have not filled these jobs in the past, and why they could or could not do so in the future.

Note: Numbers in parentheses correspond with the numbers on the slide.

Slide-Tape Narration: Navajo Forest Products Woods Operations

(1, 2, 3) The lumber mill at Navajo, New Mexico, located 10 miles northeast of Fort Defiance, Arizona, is the base of operations for the Navajo Forest Products Industry, (4) where rough natural forest materials are converted (5) to finished lumber (6) that is sold locally to the people of the Navajo nation (7) or sold commercially and transported throughout the United States. (8)

The logs and forest products come from the Navajo mountains of northeastern Arizona, (9) where Ponderosa pine is harvested through a conservation plan that will preserve the natural beauty and provide lumber for the future. (10) Lumbering operations in the woods require trail-blazing bulldozers, which begin to establish and build (11) roads on which the logs will be transported to the mill. The operators of these bulldozers are skilled Navajo operators, who accomplish the bulldozing with skill and efficiency. (12) The roads must be kept open and maintained in all kinds of weather by another Navajo who operates this road grader to maintain and repair the roads. (13)

When streams cut across the roadbed, they must be spanned by materials that are both strong and available. The operation may require the time of many Navajo workers for a short period of time. (14) These two Navajo workers are helping the operator of the rubber-tired skidder to pull (15) push and (16) adjust the logs that span across the stream. (17) As the two men unhook the choker from the last log, the logs are covered by small branches

and trees, (18) then covered with earth (19) to complete the bridge. Note how the cables stabilize the logs. (20)

With the road in, the tall mature trees become the next object of interest in the logging operation. (21) Before a tree is cut a Navajo man, called a Timber Cruiser, has gone through this section of the forest and selected trees to be harvested and marked them (22) with a blue X as can be faintly seen on this tree. (23) The Faller begins to cut with his chainsaw near the base of the tree. The work of the Faller is one of physical hard work. Cutting with the chainsaw, climbing up and over logs and brush, and carrying his chainsaw and gas can shown here, (24) The Faller moves to the other side of the tree and makes the final cut, keeping clear of the falling tree. (25)

Once the tree is down, the Bucker moves in, to cut the tree into log lengths that get the most use out of the tree. (26) The Bucker pushes in the tape measure hook at each cut, and moves up the tree, cutting off the limbs. (27) When the tape touches the Bucker's belt, he gives the tape a snap, and the tape hook comes loose. (28) Here the Bucker makes the final cut on the tree. (29) The Buckers and Fallers are paid by the number of board feet they can cut each day.

Here we see the Scaler measuring to determine the number of board feet in the log. (30) The Scaler, a young Navajo worker, is a recent high school graduate, who succeeded in math and science. He plans on working in the woods for a short time before continuing his education. (31)

After the logs have been scaled, the Skidder Operator maneuvers in his tractor where his helper can grasp the cables, called chokers, and attach them to the logs. This man is called a Choker Setter, as the nature of his job would

suggest. (32) The Skidder Operator cinches up the log, close to the skidder, (33) and moves towards the log assembly area. (34) The assembly area is called the log deck. Here the Skidder Operator pushes the logs towards the log deck. (35) The more logs that can be piled together, the easier it will be to move them. (36) Noon finds the woods crew relaxed during lunch, protected from the cool wind by the log deck and enjoying the warmth of the fire and a hot drink. (37)

The total woods operation is coordinated by the Navajo Woods Foreman, or Boss, who oversees road building, cutting crews, and log moving operations. (38) As the log deck grows, the Foreman calls on the two-way radio for a Loader to move into the area. The young man on the left is a Forester, who works closely with the Woods Boss in getting the most out of and protecting the forest. (39)

The giant crane or loader is moved from place to place by the Truck Driver, the man with the red safety helmet about to get into the cab of the truck. Note the Loader Operator as he gets ready to signal the position of the loader next to the log deck. (40) As the loader is backed in close to the log deck, the Loader Operator signals for positioning to the man, standing by the loader, who is watching and passing signals to the truck driver. (41) The Crane or Loader Operator makes a practice maneuver before loading the logging truck. (42)

The logging truck backs into position, where the trailer is lifted by the loader to the other side of the logging truck. Trailers are carried piggy-back, enabling the truck to maneuver easier. (43) The claw, a part of the loader, is the tool that grasps the logs and lifts them onto the truck. (44)

The loader, controlled by the Loader Operator, grasps the logs (45) and positions them on the truck. (46) It is the Loader Operator's responsibility to assure that the load is as balanced as possible, by placing the larger logs to the outside. (47) The truck is moved forward, and the trailer lifted into place. As the loader loads the trailer, the truck driver and his helper tie down the load with cables and chains called binders. (48) The last bit of cinching is done with an extension, to snap the boomer into place. (49) The railer is loaded in the same manner as the truck, maintaining balance. (50) The big log is lifted and placed on the trailer. (51) Everyone stands clear as the top logs are put into place, (52) thus finishing the load. (53)

This truck driver flips the binders over the trailer, and secures the load. (54) Then the loaded truck and trailer moves away from the loader, (55) and picks up speed by shifting gears as it moves down the hill. (56) The logging truck driver has to operate and control the logging truck safely through tight turns on narrow logging roads (57) and deliver the logs to the mill, where the logs are stock-piled and used during a year-round logging operation.

WOODS OPERATIONS -- FROM TREES TO LOGS

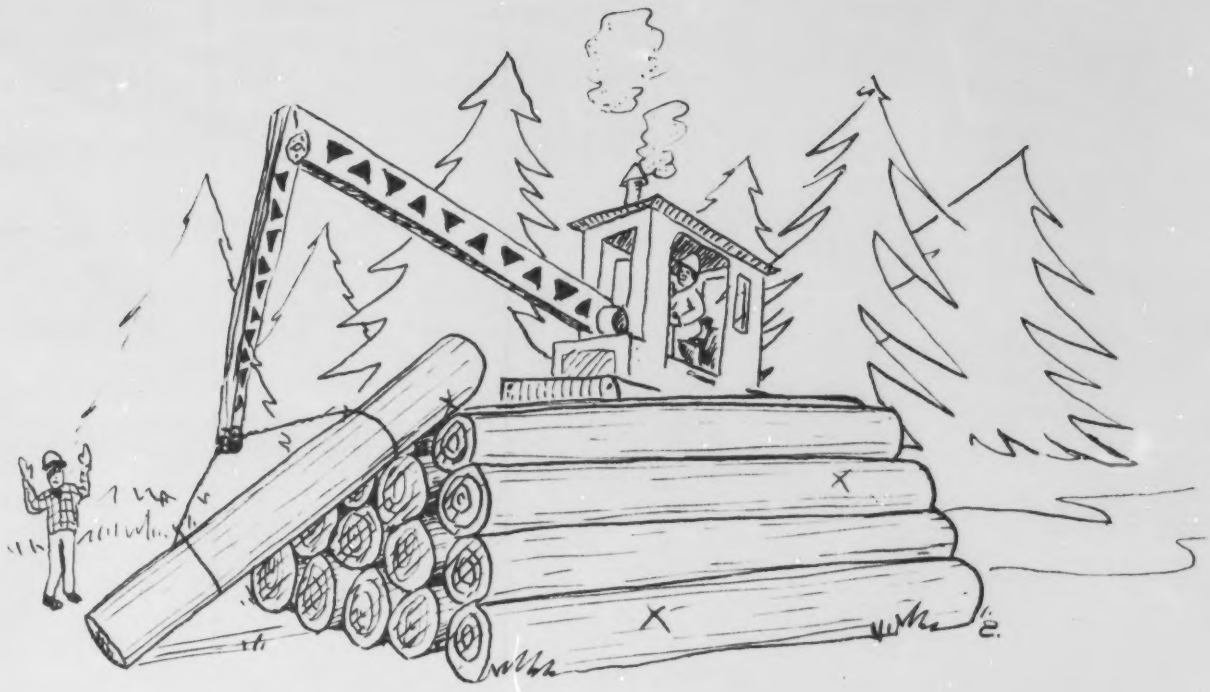
If you saw the slides about the Navajo Forest Products Industry Woods Operations, read this to review what you learned. If you did not, these pages will tell you something about logging.

The Woods Operations of the Navajo Forest Products Industry include all the jobs involved in cutting trees and getting them ready to take to the mill. There are two main types of job involved. One type is transportation--that is, taking things from place to place. The other type is harvesting.

First, the timber cruiser goes through the forest. He marks the trees that are ready to be cut down. He makes a blue "X" on each of these trees. When they know where the trees that are going to be cut are, then they decide where they will need roads to get to them. A bull-dozer operator makes roads into the woods. Sometimes bridges may have to be built across streams as well.

Once the roads are made, they must be kept up. A man who drives a road grader does this job.

When the roads are open, the woods crew goes in. The woods foreman, or boss, directs the crew. After the timber cruiser, the faller is the next man to work with the trees. He carries a chain saw and a gas can. He cuts down the trees the cruiser marked.



The bucker is the man who cuts the tree into logs. He measures the pieces off with his tape measure. Then he cuts off the limbs. Once the tree has been cut up, the scaler comes around to measure the number of board-feet in each log. He must figure out how much money the buckers and fallers will get for their work. They are paid a certain amount for each foot of wood.

After the logs have been measured, the skidder operator drives his tractor in. His helper is called a choker setter. This man helps put the cables (chokers) around the logs. Then the skidder operator can drag or "skid" the logs to the log assembly area. There they are piled into a log deck.

When the log deck is big enough, the foreman calls for a giant crane to be brought in. This crane is called a loader. The loader helps in loading the logs into the logging truck. Four people are involved in loading the logs. The first person is the loader truck driver. He moves the loader from place to place. The second person is the loader operator. He controls the loader when it lifts the logs. The third is the loader operator's assistant. He stands by the logs and signals when the loader is in the right place. The fourth person is the driver of the logging truck. He moves the truck into place for loading and also helps tie the logs down.

Once the logging truck has been loaded, the driver takes it down the mountain roads and delivers the logs to the mill.

Exercise 2. Review

When students have finished reading, write the following questions on the board:

1. What are the three kinds of transportation involved in the Woods Operation?

2. Who are the two people involved in the Operation who do not handle either machines or the trees?

3. Who are the three people who actually turn the trees into logs?

These questions can be answered in writing, or in a class discussion. Students should arrive at answers something like these:

1. Three kinds of transportation involved in the Woods Operation are: grading the road, skidding logs to the log deck, loading logs onto the truck. Trucking the logs to the mill is also a kind of transportation.

2. Two people involved in woods operations who do not handle either machines or the trees are the scaler and the woods foreman.

3. The three people who actually turn the trees into logs are the cruiser, the faller, and the bucker.

If you wish, you may have students do the first part of Exercise 5 now. That is, they can list the steps in turning trees into logs and make a chart for them, using the same steps for charting as in previous activities. (If necessary, review the steps in charting which you handed out to students. Otherwise, have students go on to Exercise 3 now and have them make charts for both phases of the lumbering operation later.

Exercise 3. Reading (The Sawmill)

Now, if possible, show students the slide-tape about the sawmill of the Navajo Forest Products Industry. A transcript of the narration for this slide-tape appears on pages 66-71 of this Teacher's Guide. You should review this transcript before you show the slide-tape. As before, the asterisks in the transcript correspond to the beeps on the tape indicating when slides should be changed.

After students have seen the slide-tape, or right after the previous exercise if the slide-tape is not available, reproduce and pass out the article about the sawmill (pp. 72-75). This article, like the preceding one, summarizes in simplified fashion the content of the slide-tape. Again, have students notice the number of different people, machines, and jobs involved in the industrial process.

Exercise 4. What Kind of Jobs Are They?

When students have finished reading about the sawmill, reproduce and hand out the list of some of the jobs done in the sawmill (p. 76). All of these jobs were

mentioned in the article they have just read. Have them read over the directions for the exercise silently. Answer any questions they may have, and make sure that they have paper for the exercise.

In this exercise, students are asked to classify each of the listed jobs into one of four categories: *transportation*, *processing*, *maintenance*, and *support*. Write the four categories on the board, and have students discuss the meanings. *Transportation* means moving things from place to place. *Processing* means actually doing something to the wood. *Maintenance* means keeping the machines running properly. *Support* means all the other functions such as secretaries, supervisors, security guards, etc.

Suggested answers appear on p. 77.

After students have completed the exercise and corrected their work, discuss the answers with them. There may be some disagreement about the category in which a given job should be placed (for instance, whether a chairman is part of Processing or of Transportation). If so, discuss these disagreements. Refer to the sawmill article when necessary.

Slide Tape Narration: The Navajo Forest Products Sawmill

(1, 2) The Navajo Forest Products Industry, New Mexico, 15 miles east of Window Rock, Arizona, presents a tour of the mill as it is overlooked by majestic Frog Rock. (3) This is the scene of the most successful business enterprise in the Navajo Nation. (4)

Logs are piled in stacks called cold decks to assure a supply of logs even in bad weather. (5) This picture shows a cold deck of logs on the approach to the front of the mill where the logs are fed into the mill. (6) All logs are trucked into the mill on company owned trucks or on some privately owned trucks belonging to some Navajo owners such as the one pictured here. (7)

Massive log moving equipment takes the logs from the truck a load at a time. (8) Here pictured is one of the massive loading machines, (9) and here's the operator, a very skilled Navajo craftsman. (10) With a load of logs firmly grasped, the loader moves away from the truck (11) and proceeds up the runway to the loading deck with another load of logs to the mill. (12) With this load of logs on the deck, the loader moves away to get another load. (13) A Navajo worker wearing muffs, not because it's cold but because of the noise factor, oversees the debarking area before the logs move into the mill. (14)

A log moves into the mill on the powerful chain on its way to becoming lumber. (15) With powerful rollers to hold the log in place, the log moves on, (16) controlled by this Navajo technician while having the bark taken off from it so it will not dull the saws located farther into the mill and also so that it will provide clean lumber. (17) This shows the log being debarked. (18)

The sawmill operates entirely from electricity that is generated by the burning of waste products from the manufacture of lumber. Shown here is a young Navajo technician as he makes an adjustment on one of the scales that records vital information. (19)

Quality control also is an important part of industry and this is true also in the manufacture of lumber. This young fellow is shown making a test of a product in part of the mill. (20)

With a plant so large with so much equipment being used, the maintenance department is very important in the production of lumber. Shown here is the Shop Foreman, as he prepares the work order for one of his employees. (21)

This very highly skilled Navajo technician is called a Machinist. He makes parts for equipment or in fact can make the tools with which he works. (22) Having an inventory of the proper parts, so that they are available immediately, is the responsibility of the man on the left who is called a Parts Manager. The man on the right is called a Runner, or a Parts Delivery Man. It may well be that most parts managers were at one time Parts Runners. (23) With big equipment required to move the logs from place to place, powerful equipment is necessary. Shown here is a Heavy-Duty Mechanic. Not because he's fat is he called a Heavy-Duty Mechanic, but because the equipment he works on is of necessity heavy equipment. (24)

Under heavy loads in rough terrain, even heavy equipment breaks down and must be welded. Here is a Navajo craftsman shown welding the bunk on a log trailer. (25) Keeping the saws sharp makes the mill operate more efficiently. One of the prize craftsmen in the mill is the saw sharpener. Shown here, wearing

the ear muffs to protect his ears from the noise, is the Saw Filer preparing the saw for the next shift that work in the mill. (26)

With powerful equipment one has to use great caution to keep from being injured or hurt badly. "Work safely" is the motto at Navajo Forest Products Industries. (27) Shown here is the man on the left whose job is to see that all safety factors in the mill are rigidly enforced. He is shown here explaining a point of information to his young assistant. (28) Once more the Safety Director is pointing out a rule of the plant to the Security Guard who restricts entrance to the plant to only those people and vehicles who should enter the plant. (29)

This is where the Security Guard works, (30) and this is the Security Guard in his office overseeing the plant area. (31) These are the security personnel who regulate the flow of people, vehicles and equipment in and out of the plant. Theirs is a very responsible job. (32)

The first contact that one has with the mill is when you walk in the door and you are greeted by a receptionist, or you call on the phone and a happy voice says, "Good Morning, Navajo Forest Products." This is that telephone operator, and the receptionist shown at work at the entrance to the mill. (33)

With an operation so large as this, a lot of book work is involved. Shown here is another lady, examining a set of books. There are many places in the mill for the Navajo woman at work. (34) The Personnel Officer not only arranges to hire people needed by the mill, but she must also take care of health records and entrance records of both employees and their families. Shown here is the Personnel Officer for Navajo Forest Products. (35)

Within the mill is an important new addition called the molding plant, where short pieces of lumber are manufactured into a usable product. Women work in this part of the mill very efficiently. This lady is shown. (36) Successful completion of work experience allows a worker to become a Supervisor. Shown here is a happy lady who is the Supervisor of the molding factory. (37)

As the lumber is cut, it must be sorted and stacked in piles of various sizes. This is the work of the chainman. These men are so called because they take the lumber from the chains in the various grades and stack it in various piles. These particular men are called green chainmen because the lumber they are handling is wet. (38)

At certain places in the mill, strong lights and loud noises make it necessary to wear appropriate safety devices. This man's dark glasses protect him from the bright lights, and ear muffs protect him from the loud noises. As he moves the lumber on its way through the mill, he is thus protected in this manner. (39)

Successful completion of routine jobs allows a person to become an operator of a machine. This man controls the lumber as it goes to the planer. (40) This is part of the machine that he controls, (41) and this is part of the planer as the board goes through in order to be shaped into proper size. (42) Ah, happiness is doing a good job, well done, and being successful in your labor, as this man shows, as he speeds the lumber on its way, (43) and of course, one of the happy times on any job is when you take a break to eat. These four Navajo workmen are on their way to lunch, at midday, half-way

through their shift. (44)

Wood is heavy and strong. That's why it makes a good building material. But to move it you must have strong machines. Shown here is a Forklift Operator with his hand on the control that raises the lumber or sets it down. (45)

One of the most important jobs in the mill is that of the lumber grader. In a split second he judges whether a piece of wood is acceptable to be used in heavy construction, or if it is a weak board that can be used only where great strength is not required. (46)

Stacking lumber is a job that can be done by the older people with the necessary skills, as theman shown here, (47) or by the strong muscular fellow, such as the one shown here, who is using this position as the stepping stone to a more responsible position in the mill. You really don't have to have your tongue held in this position to be able to do the work. (48)

The wood contained in the log is wet. To make the lumber from the logs usable, so that it will not twist out of shape, it must be dried. The drying is done in a huge oven that is steam heated to high temperature, which causes the moisture to be driven from the wood. (49) This man is shown piling the wet wood to be moved into the dry kiln oven. (50) The man shown here is indicating lumber properly dried that it is ready to be moved from the dry kiln to the area where it will be sold. (51, 52)
The lumber will then be sold locally to members of the Navajo tribe, or, (53) it iwll be packaged into this identifying paper and shipped to many places in America. (54) You have been taken on a tour through sections of

the mill of the Navajo Forest Products Industry, shown here from an aerial view, (55) but the future of the lumber industry of the Navajo nation is assured by wise forest management practices, as is being pointed out to these young Navajo people by this forester (56) so that trees like this will be available for tomorrow and forever.

EXERCISE 3. READING

THE SAWMILL

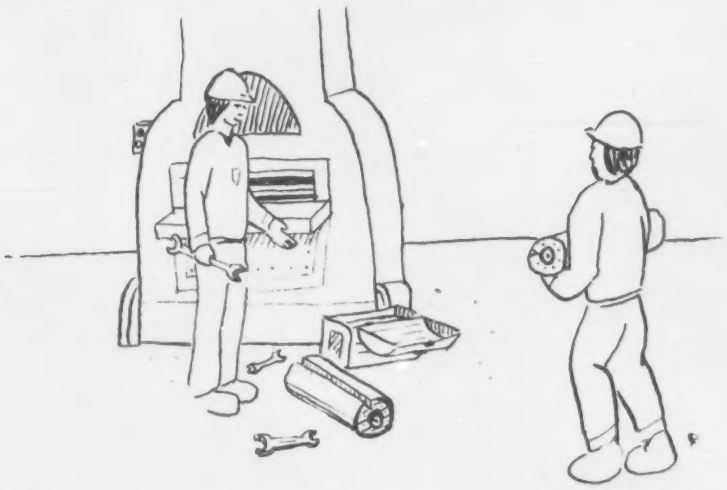
If you saw the slides about the Navajo sawmill, read this to review what you learned. If you did not, these pages will tell you something about the activities in a sawmill.

The Navajo Forest Products Industry sawmill is located at Navajo, New Mexico. There are many different kinds of jobs at the mill. Some people at the mill work on *processing*. That is, they do things to the logs to turn them into boards. Other people move the lumber from one part of the mill to another. Their jobs are part of *transportation*. Many other people are involved in *maintenance*. Their jobs keep all the machines running properly. Still others *support* the processing of the wood in various ways. They do clerical work, see to security, drive the logging trucks, bring the logs down from the mountains, and so on.

When the logs come down from the forest, they are taken from the trucks a load at a time. The loader operator stacks them in huge piles. These piles are called cold decks. From the cold decks, logs are moved to the de-barking area. One worker is in charge of this area. A technician runs the de-barking machinery. This machinery takes the bark from the logs, or "skins" them.

The skinned logs are moved to the saws. The saw operators control the machines that cut up the logs. Once the logs have been cut into boards, chains move the boards through the mill. Chainmen take the lumber from the chains. They stack the rough boards according to size. Now the boards must be planed smooth. The planer operator runs the machine that does this.

A forklift operator takes the planed boards to the lumber grader. The lumber grader decides whether a board is strong enough to be used for heavy building. If it is not strong enough, it may be used for furniture, panelling, fences or things like that. After the grader has decided what the lumber will be used for, stackers place the boards in the proper piles.



Since this lumber is still green (new), it must be dried, or else wise it will twist out of shape. The drying is done in a kiln oven. A technician decides when the lumber is properly dried. When it is dry enough, it is moved to the yard by another forklift operator. Some of the wood in the yard will be sold to members of the Navajo tribe. The rest will be packaged to be shipped to other places. A quality control monitor checks to make sure that all the wood is good enough to sell. Short pieces of lumber are collected and taken to the molding factory. There, women workers make the pieces into various products. The bark and other leftover scraps are taken to a furnace where they are burned to make electricity to run the machines. This operation is handled by technicians.

The filer sharpens the saws between shifts. He is one of several maintenance workers. Another is the shop Foreman. The machinist makes new parts. The parts manager and his assistant keep a list of what parts are in stock. The runner or parts delivery man takes parts where they are needed. The heavy-duty mechanic and other mechanics repair machinery when it breaks down. All of these people are maintenance workers.

Many other people support the operations at the mill. The safety director teaches the workers safety rules. He also checks equipment to make sure it is not dangerous. The security guard and his assistants make sure that only mill workers or others who have business there will come into the plant.

The receptionist greets visitors, and the telephone operator handles calls. Secretaries and accountants take care of the mill's paperwork. A personnel officer arranges for hiring and keeps a file of information about all the workers.

For each job area, there are supervisors and administrators who give directions and watch over the work. They are support people too.

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What Kinds of Jobs Are These?

Sawmill jobs:

1. Trucker
2. Loader operator
3. Electrical technician
4. Quality control monitor
5. Shop foreman
6. Saw operator
7. Parts manager
8. File clerk
9. Forklift operator
10. De-barking supervisor
11. Heavy-duty mechanic
12. Security guard
13. De-barking technician
14. Machinist
15. Molding factory supervisor
16. Receptionist
17. Filer (saw sharpener)
18. Chainman
19. Stacker
20. Molder
21. Personnel officer
22. Telephone operator
23. Planer operator
24. Kiln operator

Make four columns and put each job in the right one:

Transportation Processing Maintenance Support

Feedback

EXERCISE 4

WHAT KIND OF JOBS ARE THEY?

Transportation	Processing	Maintenance	Support
Trucker	De-barking technician	Parts manager	Electrical technician
Loader operator	Saw operator	Heavy-duty mechanic	Quality control monitor
Forklift operator	Chainman	Machinist	Shop foreman
Stacker	Molder	Filer	File clerk
	Planer operator		De-barking supervisor
	Kiln operator		Security guard
			Molding factory supervisor
			Receptionist
			Personnel officer
			Telephone operator

Exercise 5. From Trees to Lumber

Remind students that they have now seen and heard about how trees are cut and brought to the sawmill and how they are turned into boards. This process is really very much the same thing that Billy Whitesheep did in the cradleboard story when he went out to look for the pine and aspen wood and brought it back home so he could work on it. But in the case of a large commercial operation like logging, a great many people are involved in the work. All handle different parts of the process.

Now, ask students to review the articles about woods operations and the sawmill and write down all the steps involved in turning trees into boards. Then they should make a chart which shows this process. They may make two charts if they prefer one for woods operations and one for the sawmill. If you have already had them make a list and chart for the woods operations, they need only do a chart for the sawmill at this time. If necessary, have them review the steps in charting they were given in Activity 2. Make sure students have paper for this exercise, and remind them to use the symbol patterns they made in Activity 1.

You may have the students start the charts as homework, but since making them is likely to be a rather complex task, you will probably want to allow class time for it as well. You can ask students to help each other in their workgroups, and in addition you can circulate through the room and help those who seem to be having special trouble. Remind students that their charts should start with the trees standing on the mountain and end with the finished boards in the yard, ready to be shipped.

When students have finished the charts, you will probably want to collect the papers and go over them. Afterward, return the papers to the students and discuss the steps and charts with them. You may wish to draw sample charts on the board. Try to make sure that the students have picked out the main steps involved in turning trees into lumber, and that they understand the relationship between the steps.

The basic steps which the students should have noted are as follows:

Woods Operation	Sawmill
pick out trees to be cut	de-bark logs
cut down trees	saw into boards
cut trees into logs and trim	plane boards
pile logs	grade boards
load logs into truck and drive to mill	dry boards in oven
	package boards to be sold

Sample charts for the logging and milling operations appear on pages 80, 81 and 109 of the Teacher's Guide.

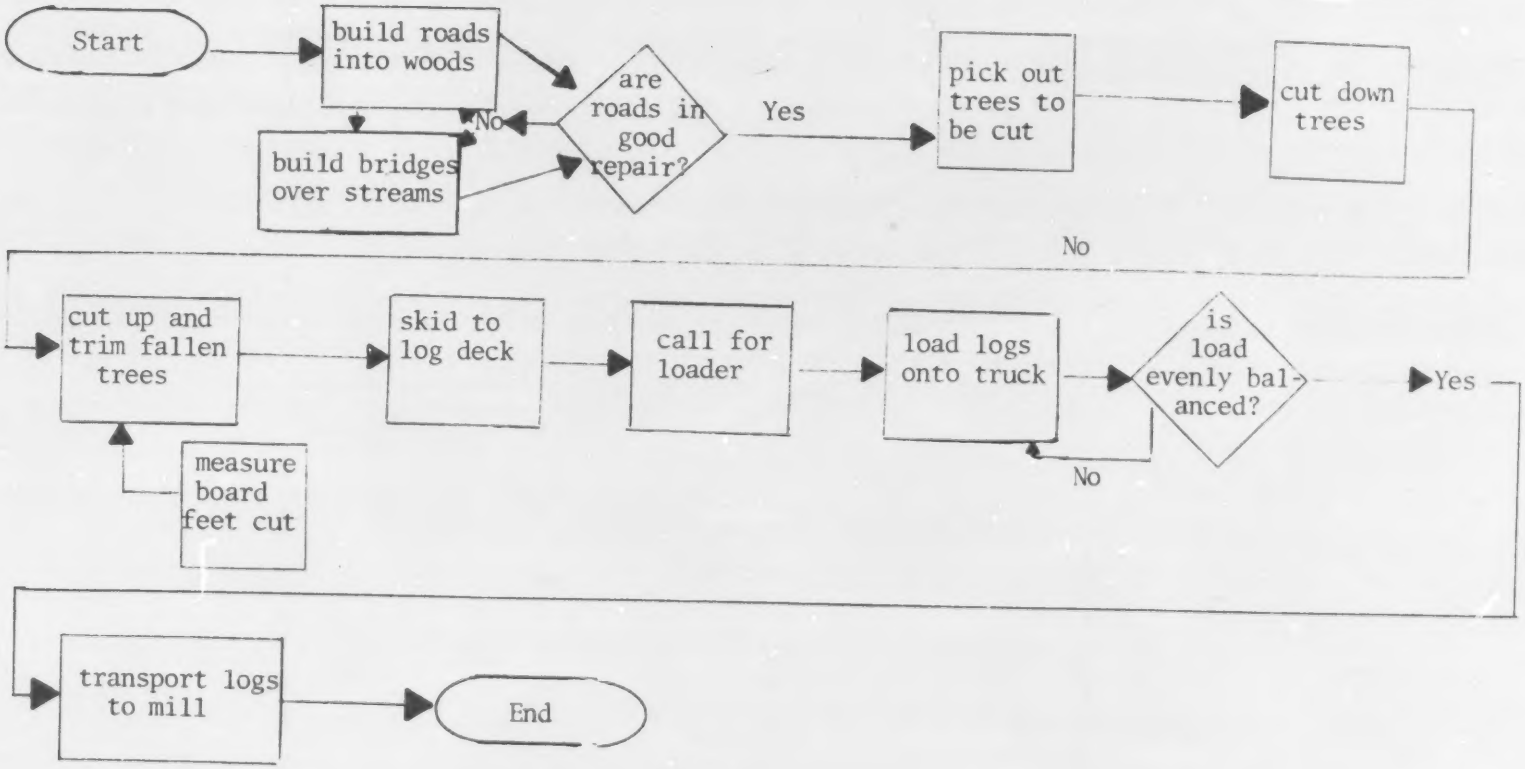
At this point, you might want to list again on the board the ten basic steps in making a product. (They are listed on page 52 of this Teacher's Guide.) Remind students that the finished product they are learning about is a playpen, and that they have discussed only part of the steps involved in making it. Ask them which of the basic steps they think they have learned about so far, and what each step consists of in terms of making the playpen.

Elicit the fact that in this Activity they have covered the first four steps in making the playpen. The steps and what each one consists of in this process are as follows:

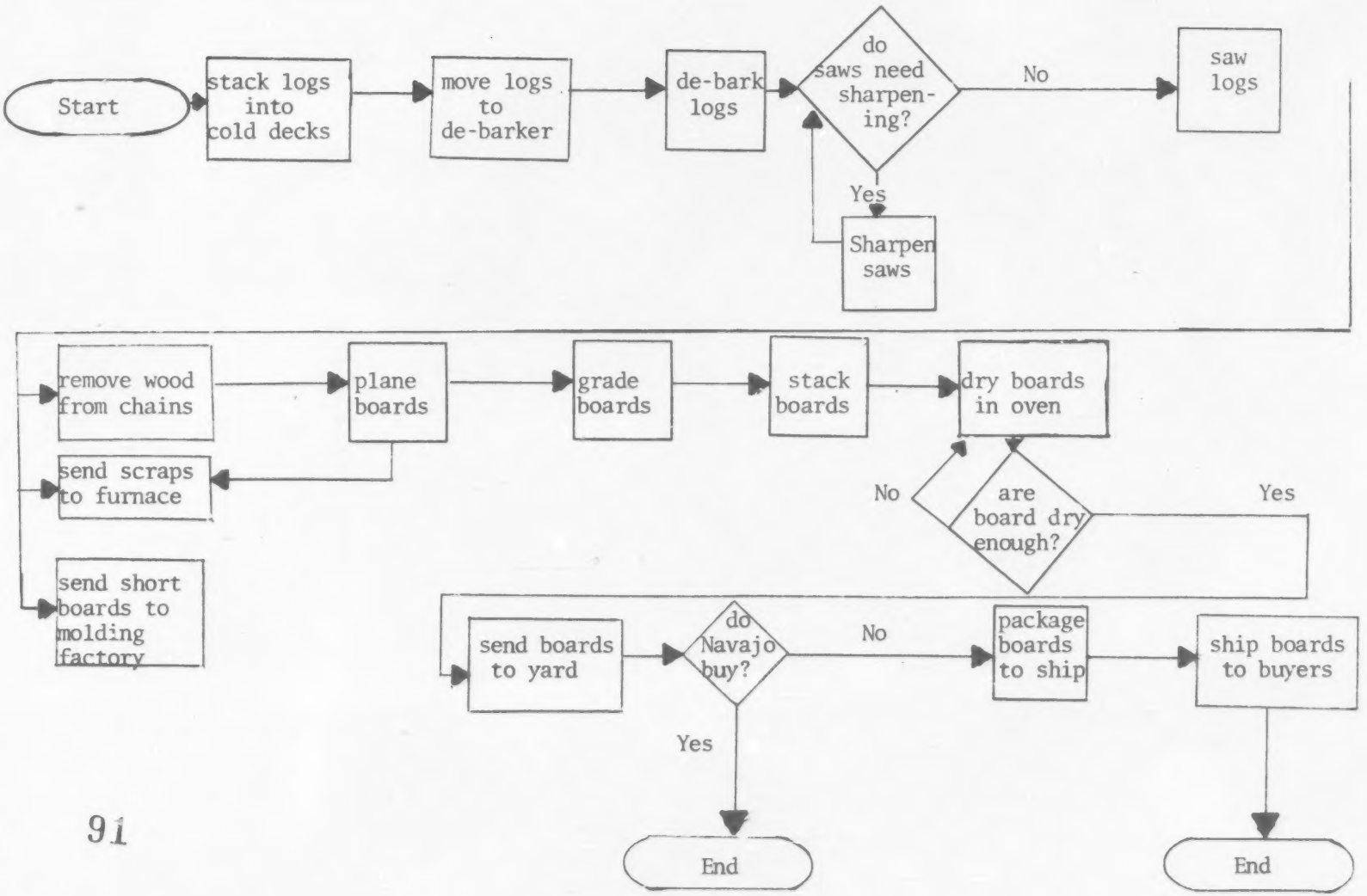
find or plant raw material	find trees to be cut
harvest raw material	cut down trees
rough process	turn trees into logs
finish process	turn logs into boards

Tell students that they will be looking at the remaining steps in making a playpen in the next Activity.

HOW TO CUT DOWN TREES



HOW TO TURN LOGS INTO BOARDS



Exercise 6. Harvesting and Processing

Remind students that in this Activity they have been talking about the *harvesting* and *processing* of raw materials. These are the first stages of preparing many different products. The raw materials that are harvested may be something which people have grown (as in the case of fruits and vegetables) or they may be something which is available on earth to begin with. Harvesting means gathering up these materials. Processing means preparing them in some way for further use. Processing may turn the original raw material into a number of different forms. For instance, wool can be made into felt cloth, knitting yarn, padding or many other things.

To help students in recognizing the stages of harvesting and processing in connection with raw materials other than wood. In this exercise, students are asked to classify a number of actions as either *harvesting* or *processing*. Begin by asking students what they think the words "harvesting" and "processing" mean. Then, reproduce and hand out copies of the exercise on p. . Tell them not to worry if they do not understand all the terms in the lists, but to look up in the dictionary any words such as "quarrying" or "smelting" which are unfamiliar. Remind students of the definitions of harvesting and processing as well; for instance, in the case of lumber, *harvesting* meant cutting down the trees, and *processing* meant making the trees into logs and then into boards. Answer any other questions which the students have, and make sure they have paper before they begin the exercise.

After students have done the exercise and corrected their work, discuss their answers with them. If any of the activities in the list are still unfamiliar or if students have trouble seeing why certain activities are classified as they are, describe and discuss those activities until the matter becomes clear.

Additional Activities

If time permits, you might want to discuss in some detail one or more other examples of harvesting and processing raw materials, including some of the jobs involved. You could choose one of the activities from the list in Exercise 6, or you could ask students if they know any other examples of harvesting and processing which they would like to discuss (for instance, farming). If possible, bring in (or have students bring in) photographs and information about the process being discussed. If enough information is available, have students make charts for the steps in the process.

Additional Resources

Additional resources for this Activity are listed and described on page 111 of this Teacher's Guide.

EXERCISE 6. HARVESTING AND PROCESSING

Fold a piece of paper in half lengthwise. Write at the top of one side; *Harvesting*, and at the top of the other, *Processing*. When you have done that, look at the list of activities below. Place each activity in the column where you think it belongs. If you find any activities which do not seem to belong in either column, write them down on the back of your paper. Use the dictionary to look up any words you do not know.

refining oil

raising cattle

weaving

growing tomatoes

catching salmon

smelting iron

printing a newspaper

mining coal

milling corn

quarrying sandstone

molding bricks

making boots

Feedback

EXERCISE 6

HARVESTING AND PROCESSING

Harvesting	Processing
raising cattle	refining oil
growing tomatoes	weaving
catching salmon	smelting iron
mining coal	printing a newspaper
quarrying sandstone	milling corn
	molding bricks
	making boots

Activity 5. Splitting Up The Work - Part 2.

GOAL:	To help students understand the steps in finishing a product in a technological setting
OBJECTIVE:	The student will construct a chart of the steps involved in mass production of playpens given processed raw materials.

WHAT STUDENTS WILL BE ASKED TO DO

- Read an article describing how an imaginary furniture company makes playpens
- Make a chart showing the steps in producing a playpen and compare these steps with the steps in making a cradleboard
- Identify some products for which processing and manufacturing are the same, and link local industries with stores that sell the products of the industries
- Identify some job titles for the logging, sawmilling, and furniture industries

MATERIALS NEEDED

- *For Exercises 2, 3 and 4:* pencils and paper
- *For Exercise 2:* students will need the charting-symbol patterns they made in Activity 1.
- *For Exercise 3:* telephone book (unless students do exercise at home); preferably one for each workgroup.

PROCEDURE

Remind students that in the last Activity they studied only the first four basic steps in making a playpen--that is, up through the finish processing of the raw material (the wood of which the playpen will be made). You might want to review briefly the steps covered so far and some of the jobs involved in those steps. Then tell students that in this Activity they will read about an imaginary furniture factory in order to learn the rest of the steps involved in making a playpen, i.e. the making of the finished product from the processed raw materials (boards).

If possible, this activity should begin with a field trip to a furniture factory. You may not be able to find one which actually makes playpens, but one which makes tables or cabinets or just about any other piece of furniture should show enough similarities to be suitable. If there is such a factory in your area and your time permits, write to the company and request permission to bring your class to visit. Explain that you would like the students to see as many of the different activities involved in manufacturing a product out of wood as possible. Ask if they could see all the stages involved in making one item, or stages for different products which are equivalent.

If a field trip is not possible, try to get a person from the company or someone else who is knowledgeable in this field to come and talk to your class. If neither field trip nor speaker can be arranged, try to get one of the films listed on page 111 of this Teacher's Guide and show it to the students.

Exercise 1. Reading (The Practical Playpen Company)

Preferably after students have been introduced to furniture-making in some concrete way, as described above, reproduce and have them read, or if necessary read to them, the introduction on page 50 and the article about the Practical Playpen Company, which begins on page 51 and continues through page 58. This article describes the steps in making a playpen from finished boards and other materials as it might be done in an imaginary furniture factory. Have students note that here, as in the logging and sawmilling industries, many different people, jobs and machines are involved in construction of the product.

THE PRACTICAL PLAYPEN COMPANY

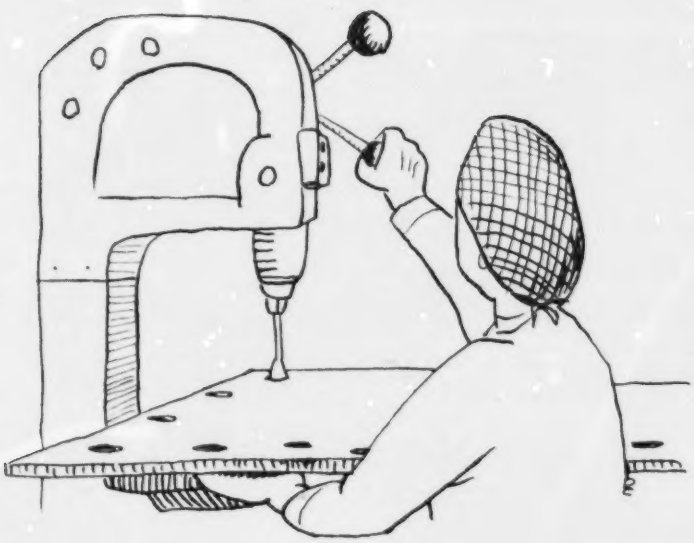
Some furniture factories are small shops where only five or six people work. They make furniture to the customer's order or for sale in nearby stores. Others are large companies which mass-produce* furniture to sell to department stores all over the country.

Most baby's playpens are made by large companies. The stages in building and the kinds of jobs people do are very similar for a playpen, a chair, or any other piece of furniture. In fact, many companies make several different kinds of furniture. They have their workers build more of one think or of another, depending on what is selling well.

*Make a lot of pieces that are all the same at the same time.

Let's see how an imaginary factory, The Practical Playpen Company, might build a playpen. Probably the first person involved in making the playpen is the furniture designer. He or she makes drawings until he has a good idea of what the playpen should look like. Then he or she figures out what size all the parts of the playpen must be and draws up exact plans, showing the sizes and the way the pieces will fit together.

The designer gives the plans to the pattern maker. The pattern maker makes a pattern for each of the different parts. These two jobs are only done once. Then the assembly line is set up. The assembly line will turn out hundreds of playpens all exactly alike. This goes on until a new style is needed. Then the designer and the pattern maker will go through their part of the process again.

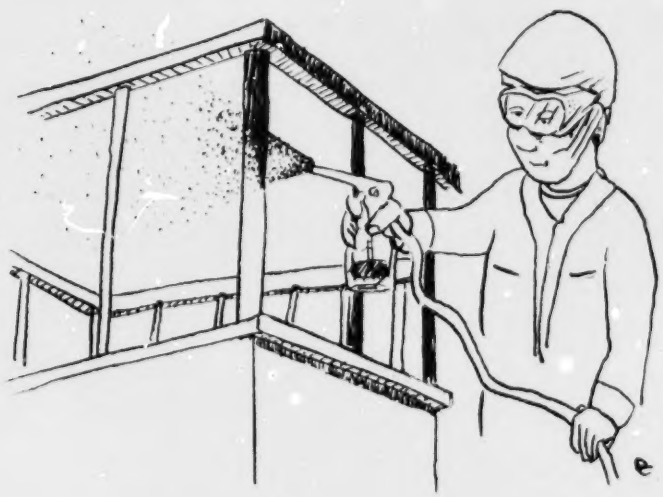


In an assembly line, the steps in making something are divided up. Each step is usually done by a different person or group of people. However, some people in an assembly line may do more than one thing. How many jobs there are on the assembly line and what they are called will depend on what machines the company owns and how many people work there.

The first stage of producing a playpen is making the pieces. In this stage, some workers use a power saw to cut the main pieces out of the boards (which may have come from Navajo Forest Products). They use the patterns made by the pattern-maker. The corner-brace-block machine operator, cuts out the triangle-shaped pieces used to brace corners. The double-end-trimmer and boring machine operator trims and bores screw-holes in the pieces. The blow-off man runs a machine that blows the extra sawdust off the pieces as they are finished.

When all the pieces have been cut and bored, they are sanded smooth by the sander and finisher. Now they are ready to be put together or assembled. Most playpens are put together with both glue and screws. The general term for a person who puts a piece of furniture together is assembler. In the Practical Playpen Company, assemblers are divided up into base assembly workers, glue jointers, glue jointers' helpers and screw installers.

When the frame of the playpen has been put together, the wood has to be finished. From this it goes to the painter, if it is to be painted. The painter usually operates a power sprayer. It goes to a stainer or varnisher if the natural wood finish is part of the design.



Now the playpen is ready for the hardware assembler. This worker adds the wheels to the legs, sets in the playbeads, adds plastic edges to the top rails to keep the baby from chewing the wood, and fits in the bottom frame. Now, if the design calls for it, the decorator adds painted decoration, decals, and so forth. When this is done, the playpen itself is finished.

While the playpen is being worked on, the playpen pad is also being made. The designer sends orders to the pad department, telling the size and shape of pad wanted. The foam shearer cuts out foam rubber pads to fit that size and shape. Another worker runs a machine that seals a vinyl cover around each pad. Last, but not least, the fumigator and sterilizer operates a machine that cleans the pad and kills any germs on it.

When all this is done, the completed pads are stored until it is time to combine them with the completed playpen frames and send them to the stores.

Large furniture companies have many of the same kinds of support people that the sawmill did. Inventory clerks keep track of supplies of raw materials such as boards, hardware, paint, and so on. Other clerks record how many playpens are completed and stored in the warehouse.

The maintenance department in the furniture factory keeps all the machines in repair. It has many kinds of repairmen and mechanics. There is also a safety officer, who makes sure that working conditions are not dangerous. He or she teaches workers good safety practices. A security guard keeps people who are not workers from wandering in among the machines. He also watches the plant at night.

Each operation in the process of making the playpen has its own foreperson. This foreperson assigns jobs, is responsible for making sure the work gets done, and deals with any problems. An inspector also checks quality control at each state. The inspector makes sure the work is done properly before passing it on to the next section.

The main office includes administrators, clerical people such as secretaries, bookkeepers and clerks, receptionists and telephone operators. It usually includes a sales department as well. The sales department arranges for the playpens to be sent to the stores that have ordered them. It also tries to find more stores that will sell the company's playpens.

Once the playpen reaches the store and it is set out on the floor, the only other person to deal with it is the salesperson. This man or woman helps the buyer find exactly the right playpen and rings up the sale.

Now, suppose Billy Whitesheep has moved to Los Angeles. His small son is getting old enough to crawl all over Billy's and Linda's apartment. Billy doesn't have the materials to make a cradleboard, but he does have his paycheck. He goes to the department store and looks at the playpens there. The salesperson explains what each one costs and shows him how it folds up, how it is cleaned, and anything else he wants to know. Then Billy makes his choice and pays for it. The salesperson folds up the playpen and wraps it in brown paper, or gets another playpen in a box from the stockroom. Then Billy takes it home.

Billy and Linda set up the playpen in the livingroom and put the baby in it. From here the baby can see everything that is going on. He sits up and begins to play with the beads set between the bars of the playpen. He grins at his parents, and Billy and Linda grin back.

Exercise 2. Putting the Pieces Together

When students have finished reading the playpen article, read the instructions for exercise 2 below or write them on the board. In the first part of this exercise, students will be asked to make a chart for the process of making a playpen (beginning with the design step). This will be similar to the charts they have made in the other activities. In the second part of the exercise, they will be asked to compare the processes of making a cradleboard and making a playpen. See that students understand the directions and have paper for the exercise. Remind them that they will also need their symbol patterns for the chart.

1. Make a chart of all the stages in the building of a playpen that you have just read about. (You may want to look back at your chart for the cradleboard, or to the list of basic stages that you wrote for Exercise 3 of Activity 3.) Start with the time the wood comes into the factory. End with the moment when the buyer puts his child inside the completed playpen.

2. Take another piece of paper and fold in half the long way. At the top of one half, write *cradleboard*. At the top of the other, write *cradleboard*. At the tope of the other, write *playpen*. Now look at the chart you made for the cradleboard and at the list of basic stages in producing something (page 32). Then write down the main steps involved in making the cradleboard, from the beginning, in the left-hand column. When you are done, go to the right side, and put down the step from the making of the playpen which is most like each of the steps in making the cradleboard. Start with getting the wood.

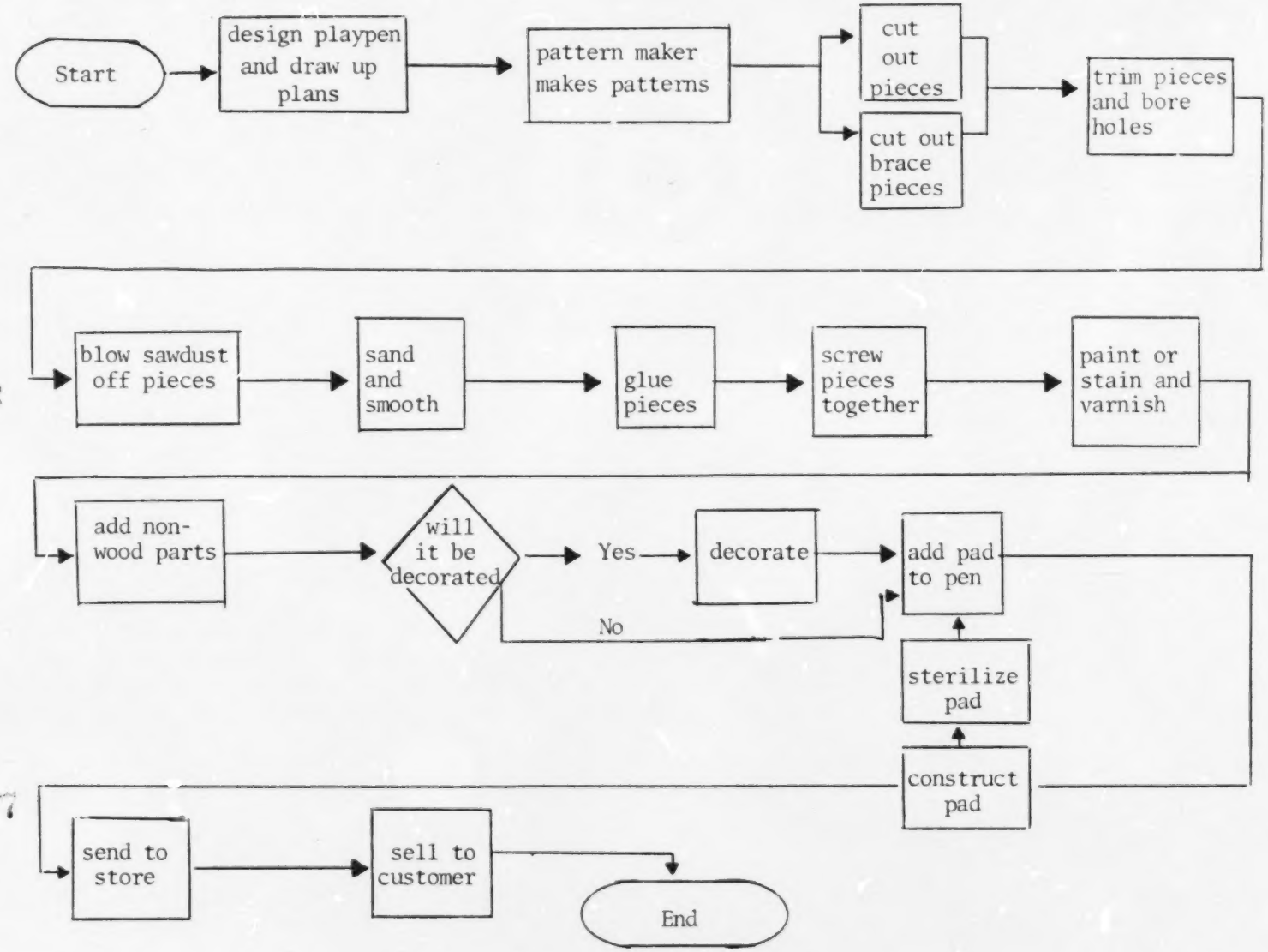
In making a chart for building a playpen, students are advised to look back at the charts they made for building a cradleboard and at the ten basic steps in making a product which they worked out at the end of Activity 3. (Remind them that their chart for the playpen will only cover the last six steps in the process, i.e. from the design step forward.) If necessary, they should also refer back to the steps in charting. You might assign the chart as homework, or you could have the workgroups work together on it in class and help each other.

If you wish, you can collect the charts and correct them, and/or discuss them with the students, as soon as they have been finished. Or you can postpone the discussion until after students have completed both parts of the exercise. A sample chart for the process of building a playpen is shown on page 96 of this Teacher's Guide.

Students will also need to refer to their list of steps in making a cradleboard when they do the second part of this exercise. You might ask each workgroup to do this part of the exercise as a group. A sample answer page for the second part of the exercise appears on page 97 of this Teacher's Guide. When students finish this part of the exercise, you should correct their papers and/or discuss the answers with them. You might want to write the parallel lists on the board, perhaps working from class suggestions. As you write the playpen steps, ask students for the job title(s) of the person(s) who perform(s) each step in making the pen (e.g. designer, assembler). Discuss the similarities and differences between the two lists, e.g. that they involve the same steps, but the playpen involves many people and machines, and also does some of the steps in a different order.

Now that students have finished examining the process of making something in industry and have compared this process to the process of making a product done by one person, have them discuss again the advantages and disadvantages of making products in an assembly-line or industrial fashion. (Refer to discussion on page 54 of this Teacher's Guide.) You might want to have students write a paragraph about these advantages and disadvantages.

BUILDING A PLAYPEN



SAMPLE ANSWERS FOR EXERCISE 2, PART 2

Cradleboard	Playpen
decide what to make	design playpen (5) (designer)
find kinds of wood needed	find trees to make into logs (1) (cruiser)
cut wood and bring it home	cut down trees (2) (faller)
cut main pieces	cut out main pieces of playpen (6) (corner-brace-block operator)
soak wood	cut trees into logs (3) (bucker)
sand and smooth pieces, burn holes	make logs into boards (4) (saw operator, planer)
put pieces together	assemble playpen frame (7) (assembler)
add padding, cover, lacing etc.	add pad (8) (foam cutter)
decorate with beads	paint, add decals, beads etc. (9) (painter)
give to baby's mother	sell to consumer (10) (salesperson)

Note that the steps in building a playpen, when matched to the steps in building a cradleboard, do not come out in the order in which they really occur. For your reference, the number of the corresponding step in the ten basic steps in making a product is given in parentheses after each step in the playpen operation shown above. The job title of the least one person connected with that step is also given, to help in your class discussion.

Exercise 3. Other Products

This is a simple research exercise that should help students relate what they have read to their own town and their daily lives. In this exercise, students will be asked to name three products for which the processing and manufacturing stages are the same (that is, for which processing is at a minimum). They also will be asked to find three places in their area that manufacture a given kind of product and three stores that sell that product.

This might be a good exercise to assign as homework, although it can be done by the workgroups in the classroom also. When you are ready to have students do the exercise, the directions for the exercise are printed below, or write them on the board. Make sure that students have paper and understand the directions for this exercise. If the exercise is being done in class, students should also be provided with a telephone book to use for the second part of the exercise. (If necessary discuss with students the procedure for finding things in the Yellow Pages.) If possible, have a phone book for every workgroup.

> Name three products for which the processing and manufacturing stages are the same (that is, products which are harvested, fixed up a little, and then sold). If you have any trouble listing products like this, think of things you would find in a grocery store or at home.
>
> 2. Find the yellow pages in your town's phone book. Write down the names of at least three places that manufacture some kind of product in your area. Then write the names of three stores that sell this kind of product (or products of which this item is a part.)

When students have finished the exercise, discuss it with them. In regard to the first question, explain that many fruits and vegetables fit in the category of items for which processing and manufacturing are the same. If sold fresh, they can be used in almost the same state as the state in which they are harvested. Some building and heating materials also fit in this category. These items short-cut some of the steps in making a product.

Answers will vary in regard to the second question, of course, depending on the product chosen. If any of the students have chosen a product in which the class shows interest, you might try to arrange a field trip to one of the factories, one of the stores, or both (especially if a field trip to a furniture factory was not possible).

Sample answers for this exercise are given below.

Sample Answers

A. Three products for which the processing and manufacturing stages are the same are : milk, firewood, tomatoes. These are a few examples among many. In general most fresh fruits and vegetables would fall into this category, and some heating and building materials also.

B. The answers to this question will depend on where students live. If they live in an area where lumbering is a big industry, for instance, they might list stores that sell lumber or anything made of wood.

Another possible extension would be to set up a research project or projects to learn the steps and some of the job titles involved in making some other manufactured product in which the students are interested. Depending on time and resources, you could have each workgroup prepare a report (complete with list of steps and chart) on a different product, or all the groups could work on the same one. If possible, let students choose or help in choosing the product(s) to be worked on. If the product(s) is/are made locally, students might write to or telephone a factory to find out the steps in manufacturing the item(s).

Additional Resources

Additional resources for this Activity are listed and described on page 111 of this Teacher's Guide.

Exercise 4. Word Search

This exercise is a review exercise of sorts, set up in the form of a puzzle. In this exercise students are asked to recognize a number of listed job titles from the logging, milling and furniture industries when the titles are presented among jumbled letters in the puzzle. It's a little like a filled-in crossword puzzle in which the student's task is to separate the words from what ought to be the blanks.

To prepare for the exercise, duplicate copies of *Word Search* on page 100 in this Teacher's Guide. Make sure that there are enough copies for the whole class.

When you are ready to have students do this exercise (any questions they have about what they are to do) distribute copies of *Word Search* to the class, and answer when students are finished, give them copies of the completed puzzle on p. 101 so they can check their work.

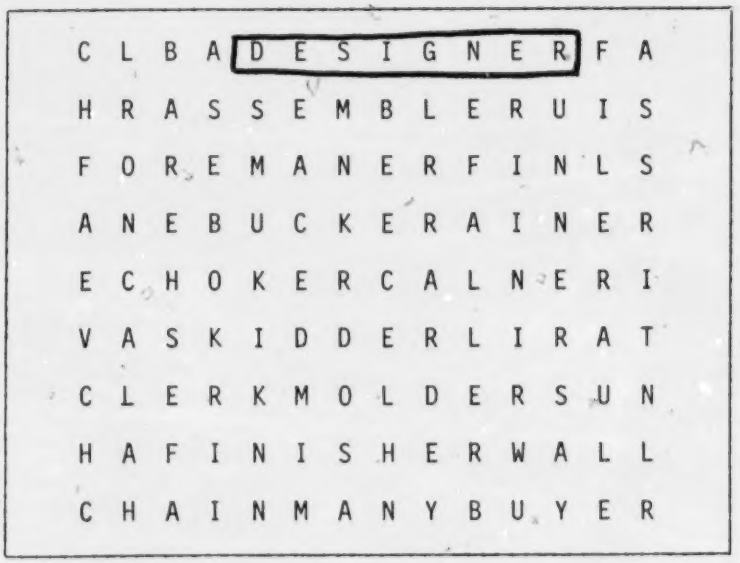
Additional Activities

Now that the production process has been covered, have the class visit a furniture store, look at a mail order catalogue, or in some other way investigate ways in which completed products are sold. If you have time, such an activity might be developed into a lesson on how to purchase from a large store. The product investigated should be furniture if possible, but it doesn't have to be.

WORD SEARCH

How many of the following job titles from lumbering, milling, and furniture-making can you find in the puzzle below? One work has been outlined as an example.

	Crossways		Down
designer	choker	finisher	runner
assembler	skidder	chainman	filer
foreman	clerk	buyer	faller
bucker	molder		


C L B A D E S I G N E R F A
H R A S S E M B L E R U I S
F O R E M A N E R F I N L S
A N E B U C K E R A I N E R
E C H O K E R C A L N E R I
V A S K I D D E R L I R A T
C L E R K M O L D E R S U N
H A F I N I S H E R W A L L
C H A I N M A N Y B U Y E R

Feedback

WORD SEARCH

C	L	B	A	D	E	S	I	G	N	E	R	F	A
H	R	A	S	S	E	M	B	L	E	R	U	I	S
F	O	R	E	M	A	N	E	R	F	I	N	L	S
A	N	E	B	U	C	K	E	R	A	I	N	E	R
E	C	H	O	K	E	R	C	A	L	N	E	R	I
V	A	S	K	I	D	D	E	R	L	I	R	A	T
C	L	E	R	K	M	O	L	D	E	R	S	U	N
H	A	F	I	N	I	S	H	E	R	W	A	L	L
C	H	A	I	N	M	A	N	Y	B	U	Y	E	R

Using The Test

The test questions on the next four pages are intended to check student mastery of the main points covered in this unit. If your presentation of this material has varied to any significant degree from what is in this book, you may want to add or replace questions on the test.

In addition to serving as a measure of student achievement, having students answer these questions can serve as a useful review activity.

Sample answers appear on pp. 107-110.

Name_____

Date_____

QUESTIONS FOR STUDENTS WHO HAVE FINISHED

"FROM IDEA TO PRODUCT"

1. Look at the pictures below.

   a. What is the same about all three things?

   _____

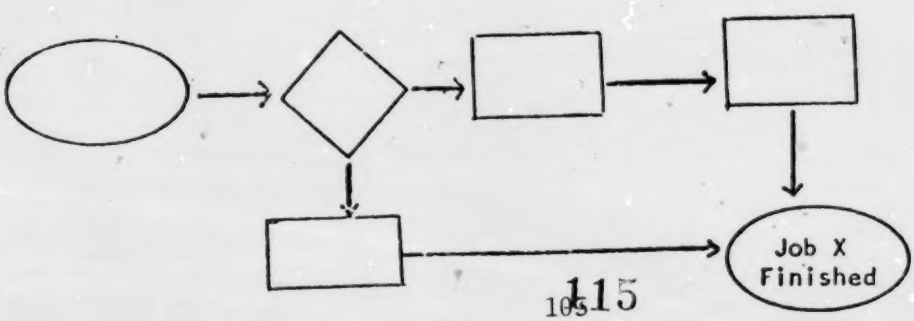
   b. Which one is different? Why?

   _____

2. This chart tells you how to finish "Job X".

   a. How many actions does it tell you to do? _____

   b. How many decisions does it tell you to make? _____



3. How is a product made? You know that the first step is the idea. The last step is the product itself. Name at least five of the steps in between. For example, the first step after the idea might be getting the materials you need.

1.

2.

3.

4.

5.

4. In a factory, a lot of people work together to make one product. Each person does only one or two steps in making the product.

a. What is one good thing about working this way?

_____

_____

b. What is one bad thing about working this way?

_____

_____

5. Two products are shown below. Many different people have to help to make each one. What are these people called? For each product, list the job titles of four people who help make it.

(For example, a job title of someone who helps make a wooden board would be "Faller.")

a. wooden board

1. _____

2. _____

3. _____

4. _____

b. playpen

1. _____

2. _____

3. _____

4. _____

6. Here are two lists of jobs. One of them shows the main steps in building a tepee. The other shows the main steps in building a house. Both lists are in the wrong order. Draw lines from one list to the other to show the actions that are nearly the same. One pair of jobs has already been connected.

TEPEE	HOUSE
sew pieces together	house painters do their job
find buffalo	carpenters nail boards together
set up tepee and use	lumber company cuts up logs
tan hides	plasterers and plumbers work inside of house
paint designs on sides	architect draws up plans for house
shoot buffalo	move into house
insert poles	select trees to be cut
skin buffalo	lumber store cuts boards into sizes needed
trim hides to right shape	carpenter planes and smooths boards
plan how to make tepee	loggers cut down trees

Sample Answers

30 points possible

Name_____

Date_____

QUESTIONS FOR STUDENTS WHO HAVE FINISHED

"FROM IDEA TO PRODUCT"

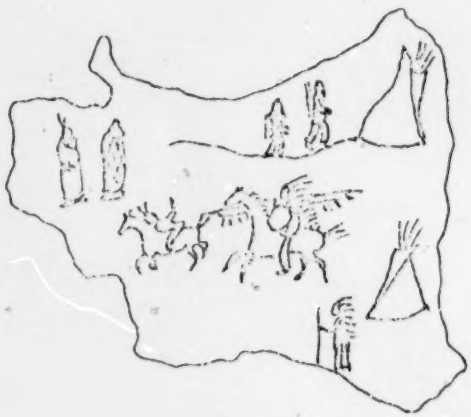
4 pts. 1. Look at the pictures below.

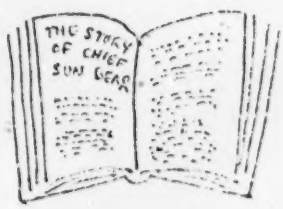
a. What is the same about all three things?

They are all ways of communication through symbols.

b. Which one is different? Why?

The book is different because it uses words instead of pictures.

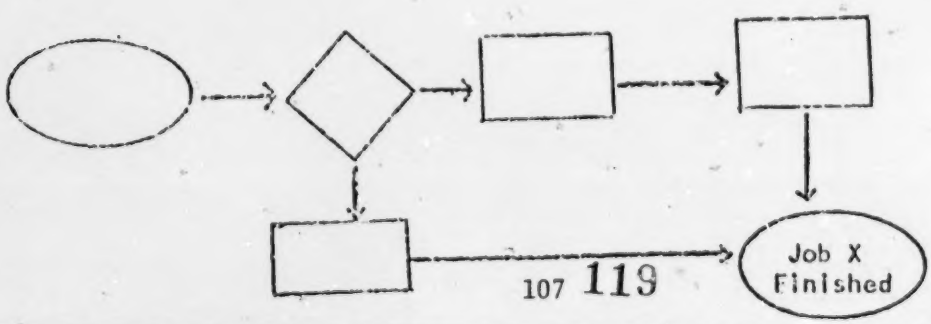




2 pts. 2. This chart tells you how to finish "Job X".

a. How many actions does it tell you to do? *3*

b. How many decisions does it tell you to make? *1*



5 pts. 3. How is a product made? You know that the first step is the idea. The last step is the product itself. Name at least five of the steps in between. For example, the first step after the idea might be getting the materials you need.

1. *Any of the following:* *locate materials*
harvest or gather materials
rough process (begin to prepare materials)
2. *finish process (finish preparing materials)*
design product
make main pieces
3. *put main pieces together*
add extra parts
decorate
4. *sell or use*
5.

4 pts. 4. In a factory, a lot of people work together to make one product. Each person does only one or two steps in making the product.

a. What is one good thing about working this way?

Somebody can learn to do his part very well and do it very quickly, so more of the product can be made in a short time.

b. What is one bad thing about working this way?

The worker does not get to see the finished product, and does not have a sense of accomplishment. This may result in sloppy work.

8 pts. 5. Two products are shown below. Many different people have to help to make each one. What are these people called? For each product, list the job titles of four people who help make it.

(For example, a job title of someone who helps make a wooden board would be "Faller.")

a. wooden board

Any of these:

timber cruiser
faller
bucker

de-barking tech.
saw operator
chainman
planer operator
kiln operator

credit may also be given for transportation, maintenance, and support or supervisory jobs.

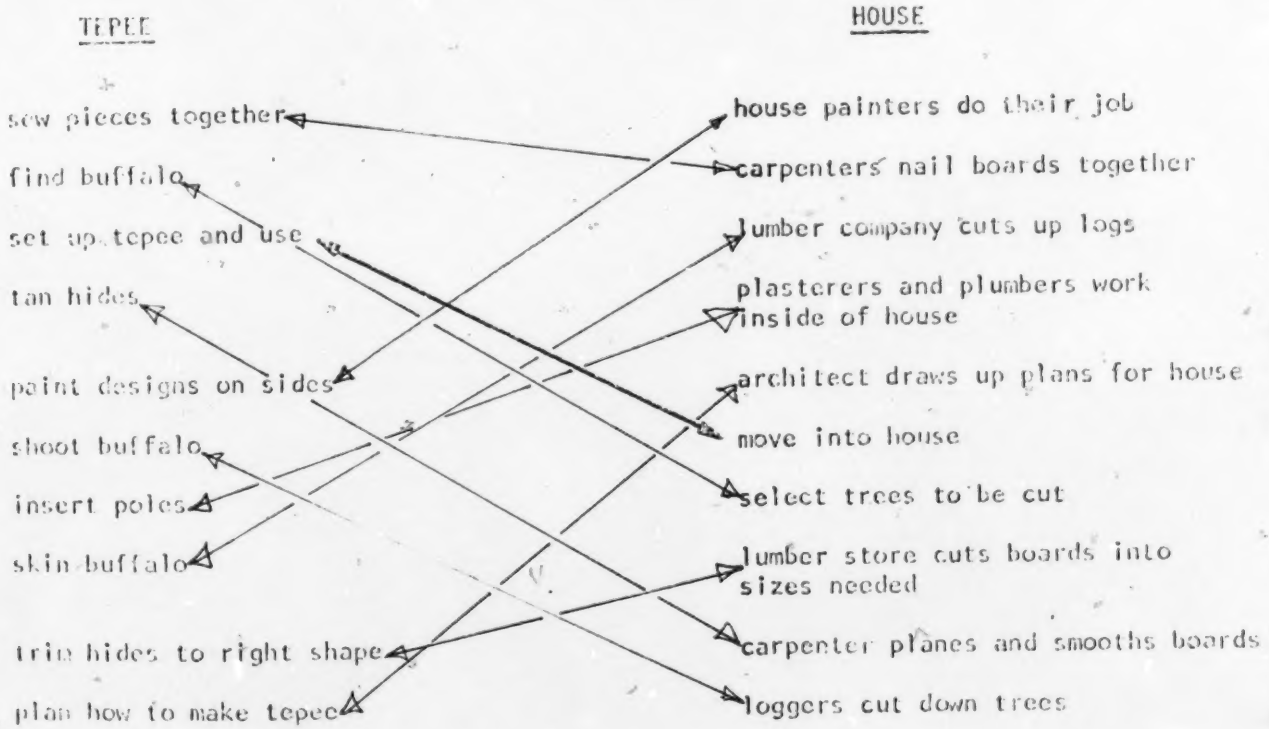
b. playpen

Any of these:

furniture designer
pattern maker
saw operator
corner-brace-block machine operator
double-end-trimmer
boring machine operator
blow-off man
sander and finisher
assembler
base assembly worker
glue jointers and helper
screw installers
painter, stainer or varnisher
hardware assembler
decorator
foam shearer
sealer
fumigator and sterilizer

credit may also be given for transportation, maintenance, supervision and support, and sales jobs.

6. Here are two lists of jobs. One of them shows the main steps in building
9 pts. a tepee. The other shows the main steps in building a house. Both lists are in the wrong order. Draw lines from one list to the other to show the actions that are nearly the same. One pair of jobs has already been connected.



Additional Resources

Apache-Navajo Career Education Media Center, P.O. Box 749, St. Johns, Arizona 85936
available to schools in Navajo and Apache Counties in Arizona

Filmstrips:

Catalog	#H.10-2-14	NATIONS BUILDERS
	#H.10-2-15	BUILDING TRADES
	#H.10-2-23	BASIC TOOLS FOR WOODWORKING

Instructional materials:

#E-6-186	NAVAJO WORKER SERIES - SAWMILL
#E-6-189	NAVAJO WORKER SERIES - WOODS OPERATION
#JH39	THE CARPENTER AT WORK
#H.1-52	CAREERS IN FORESTRY
#H.10-0-3	WOOD (Occupational mini-briefs)

National Film Board of Canada, 16th Floor, 1251 Avenue of the Americas, New York, N.Y. 10020
(16mm Films available for purchase and rental in the United States)

FORESTERS

There has been greater progress in the science of forestry during the past several decades than in all previous time, and it is the practitioner of the trade, the professional forester, whose day-to-day work is most responsible for making effective the discoveries, experiments and research carried out at forestry stations across the land. This film shows both the modern technology of the timberlands and the role of the forester in the preservation and regeneration of this great natural resource.

Phoenix Indian School, Pheonix, Arizona
films have been received through the Bureau of Indian Affairs

Filmstrip #244 OUR DEPENDENCE ON LUMBER WORKING